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The New Chronology of the Pantheon.

ABOUT two months ago we referred, with astonishment and no little scepticism (a feeling shared by some of the first English archæologists of the day) to the theory about the rotunda of the Pantheon which had been propounded by M. Chedanne, a young French architect, and set forth in an article in the *Revue des Deux Mondes* in August last by the French sculptor M. Guillaume, to the effect that the rotunda was not of the age of or the work of Agrippa, at the date of 27 B.C. but a building of the second century A.D., erected in the reign of Hadrian, and that it was tacked on to the portico instead of the reverse process hitherto believed in. The inherent architectural improbability of the portico being erected first and a circular building added behind it seemed too strong an æsthetic argument to be passed over, and it must be added that the rather inflated style of M. Guillaume's article, which was manifestly a piece of trumpet-blowing for French archæology, was not calculated to predispose one to an attitude of faith. Whatever we may think, however, of the good taste of the *Revue des Deux Mondes* article, it would appear that the trumpet has not been vainly blown, and M. Chedanne has led the way to one of the most important discoveries for some time back in Roman archæology, and has established the fact of the later date of the rotunda, though as we shall show, there is room for another theory than the improbable one of the round building having been actually built against and fitted to the portico as it stood. Possibly if M. Chedanne had written the article himself, in a more practical style, and accompanied it with representations of some of the objects which furnish the evidence for this view, he would have found more ready acceptance than was likely to be accorded to the rather exuberant eloquence of M. Guillaume.

As is well known to all students of Roman archæology, an inscription on the frieze of the octastyle portico records that the Pantheon was built by Augustus's able Minister and relative, Marcus Vipsanius Agrippa, during his third Consulship, that is, in the year 27 B.C. The inscription runs thus :—

M. AGRIPPA . L . F . COS . TERTIVM . FECIT.

And this inscription has naturally been taken to refer to the whole structure; more especially since the point of junction between the great portico and the rotunda behind it appeared to show that both were of the same date and had been built together—not that one had been added to the other.

Early in the present year, 1892, the appearance of certain patches of damp on the inner surface of the dome rendered necessary some repairs to the stucco lining of the coffers of the dome and a careful investigation of the point where the rain was able to soak in from the outside.

The Italian authorities very kindly allowed the work of repair and investigation, together with the erection of the necessary scaffolding, to be placed under the superintendence of M. Chedanne, who is one of the Prix de Rome students in the Villa Medici.

This enabled M. Chedanne to make a new and very careful set of measurements of the whole building, and to produce a most valuable set of drawings for his *envoi*, to be submitted to the authorities of the École des Beaux-Arts in Paris.

As already noted, the result of the investigations which were thus made has been described, with a certain amount of rather tentative theorising, by M. Eugêne Guillaume, the able French sculptor who is now Director of the École Française de Rome, in the *Revue des Deux Mondes* for August, 1892, p. 562; and the subject has also been treated by the Roman archæologist, Signor F. Bongioannini, in the "Nuova Antologia," vol. xli., serie iii., fascicolo del 1° Settembre, 1892. The conclusions arrived at by these two authorities are not altogether the same, and it may, perhaps, be well to indicate briefly what appear to be the really important pieces of evidence, and what the most probable conclusions to be derived from them seem to be.

First, with regard to the comparatively late date of the rotunda, the one really valuable and, it may be said, conclusive piece of evidence, is derived from the inscriptions stamped upon the bricks which are used as facing and as bond-courses in the solid concrete both of the drum and of the dome.

A large number of these bricks or tiles (*tegulæ bipedales*) have been withdrawn from various parts of the structure, and all their stamps agree as to the date of the tiles being not earlier than the first half of the second century A.D.

As examples of these brick stamps we may quote the following; the inscriptions are arranged in the usual manner in two concentric circles around a central badge or symbol. It is to be regretted that neither M. Guillaume nor Signor Bongioannini have in their articles quoted these inscriptions, which are by far the most conclusive evidences of date.

1. DOL ANTEROTIS SEVERI
CAESARIS N

Badge or *trade-mark*, a bull's head. This may be translated: "Clay work of Anteros Severus [slave or freedman] of his Majesty."

2. C AQVILI APRILIS EX PRAEDI
CAES BIPEDALE DOLIA

Badge, a pine-cone. "Two-feet tile of clay-work made by Caius Aquilius Aprilis on the imperial clay-fields."

3. ROSCIANI DOMIT AGATHOB

Badge, a bust of Isis between a palm-branch and a sistrum. The translation of this is doubtful; it may mean "Clay-work of Roscianus [freedman] of Domitianus Agathobulus."

4. APRILIS CN DOMITI
AGATHOBVLI

Badge, a bull's head between two palm-branches. "Clay-work of Aprilis [freedman] of Cn. Domitianus Agathobulus."

5. TEG DOL DE FIG IVLIAE
PROCVL FLV NEG

"Tile-work of clay from the potteries of Julia, the daughter of Proculus."

All these inscriptions have previously been discovered on bricks in other buildings, and they are known, from various reasons, to be of about the time of Hadrian. Brick-stamps of any kind of as early a date as Agrippa's time, in Rome at least, are unknown.

The fact that *tegulæ* bearing these inscriptions have been found in many different parts both of the walls and of the dome is sufficient evidence that they do not belong to

a partial repair of an older structure. They must, therefore, be taken as evidence that the existing rotunda and dome were not built till about a century and a half after the time of Agrippa.

The second important piece of evidence was the discovery of an earlier pavement nearly seven feet below the present floor of the rotunda, showing that the original Pantheon stood at a considerably lower level than the existing building.

On the whole, the most probable theory of the structural history of the Pantheon appears to be this,—that Agrippa built the existing portico, which bears his name, as the approach to a *cella*, which was probably of the normal rectangular form; the pavement of this *cella* being that of which a portion has been exposed at the lower level.

Then, in the time of Hadrian, the original *cella* was pulled down, and, in its place, the present domed rotunda was built, with its floor at the higher level.

Agrippa's portico was at the same time taken down and carefully rebuilt on to the new circular *cella* at the higher level; the inscription on the frieze not being interfered with.

This would account for the absence of any signs of two different dates at the junction of the portico with the rotunda. The inscription, therefore, must be taken to refer to the portico only, with its sixteen magnificent monolithic columns of red and grey Egyptian granite.

At present this theory is only conjectural, but there can now be little doubt as to the rotunda not being earlier than the second century A.D.. Further investigation may possibly throw clearer light on this difficult and very interesting problem.

A FORGOTTEN ROMAN SITE.

LESS than four miles from the still flourishing city of Seville, and accessible therefrom either by means of a raised *carretera*, or high-road, leading across the often flooded lowlands, and then skirting the foot of the tertiary hills of the district; or by a footpath passing through fields and oliveyards, but often rendered impassable by floods, lies the site of the very little celebrated city of Italica. It is at the foot of the hills, but is not, like Seville, on the banks of the rushing Guadalquivir, and the visitor who stands among its few ruins wonders why it ever was a city. Yet, during the Roman dominion in Spain not only was it a city, but it appears to have been the most important settlement of the district. No less than three emperors were natives of it. Here, in September, A.D. 52, was born the great Trajan; here, also, according to Spanish authorities, Hadrian, Trajan's adopted son, first saw the light, and Theodosius the Great is also claimed as a native of Italica. In these days, though Seville was also a Roman colony, Italica appears to have been the larger, and to have had the better-known place as its dependent. Of history Italica seems to have but little, but the site has served for a perpetual quarry to the many generations of Moors and Christians, who have erected their alcazars, mosques, churches, and palaces in the neighbouring city; and, though at the present time there is little to be seen above ground, there is no doubt that enough exists below it to give a rich reward to those who may undertake an intelligent excavation.

The principal extant ruin is that of the "plaza," "circo," or amphitheatre, only small portions of which rise above the level of the ground, while much seems to have been excavated in the rock. Some of the vaults beneath the ranges of seats are still entire, and in one of them is a perennial well of water. The arena and the lower tiers of seats are nearly perfect, while masses of tumbled rubble work are all that remain of the higher walls. At one extremity of the ruin a marble slab gives the information that the area was excavated under the orders of the "Comision de Monumentos," in the reign of Isabel II. This, with fragments of a mosaic pavement, remains of the walls of some houses, an elliptical tank that seems to have been a vivarium, and a few sections of columns, is about all there is to be seen. For the rest of what has been found upon the site we must go to Seville. How many of all the Roman captals that grace the shafts in the courts of the Alcazar, how many of the shafts in cathedral, church, and palace, came from Italica, it is impossible now to tell; but it is certainly known that the numerous statues, some of them perfect, to be found in the Casa del Pilatos (the palace of the Dukes of Medina-Celi), and in the Museo Provincial, that partly fills the ample precinct of the ex-convent of La Merced, were brought from there. In the former edifice each angle of the fountained court is adorned with a complete Roman statue, one of them of Minerva; while in the garden and in other parts of the building are several columns, busts, and statues from the same convenient quarry. The museum contains two or three more or less imperfect statues of Trajan, and a considerable number of architectural fragments,—just enough to raise the wish that systematic excavations could be undertaken upon the site,—a consummation not likely to be realised, even with the best possible wishes, in the present impoverished condition of Spanish finances.

Ruined though the amphitheatre of Italica is, it is, in many respects, more impressive than the almost entire one at Segovia, whish, until very recently at least, has been used as a bull-ring or Plaza de Toros. The impressiveness of the latter amphitheatre is diminished by the changes it has undergone in modern times to fit it for a bull-ring, while the other remains unchanged, and the visitor can dream in solitude of the former grandeur of this now almost forgotten city. As the plough passes over the fields in the vicinity it often brings up coins of copper, iron, or silver, stamped with the names of various Emperors, and our would-be guide from the neighbouring village of Santiponce boasted his possession of several.

It is not known why or when Italica ceased to be the abode of a busy population. Its downfall must have occurred during the troublous times of the struggle between Suevi and Goths, during the domination of the latter; or in the early days of Arabian occupation, for after this time it is only known as a site from which marbles might be obtained. It has already been said that the river does not now pass by Italica, but it appears possible that in Roman times it approached close to the walls. Up-stream, a few miles from Seville, the Guadalquivir flows at the foot of the hills, and down-stream, five or six miles from the latter place, it closely hugs the same low range of elevations. Whenever there is a freshet, a considerable portion of the extra waters find their way through what seems to have been the ancient channel, and at such times it is impossible to reach Italica and Santiponce except by means of the high road which crosses the flood by a viaduct. If in ancient times the river flowed by Italica, its recession from its former course may, in part at least, account for the decay of the place.

The modern village of Santiponce is situated about half a mile nearer to Seville than the amphitheatre of Italica, and, like most of the villages of Southern Andalusia, is a collection of mud or rubble-built, one-story habitations, all coated externally with plaster, and white-washed. This whitewashing of the outside of everything is general in Southern Spain, and necessarily gives to the villages, in spite of their vineyard and oliveyard surroundings, a monotonously glaring aspect. In such a city as Seville the effect is worse, for the universal plaster and whitewash conceals it would be hard to guess how many beauties in the form of Arabian arabesques (the dim forms of a few of which may be traced), and Roman, Arab, and Mudejar (transitional) sculptures. In their rage for a clean, white surface, some of the improvers (were they churchwardens?) have at various times cut away the bases of the colonnettes of the recessed porches of the churches. The half-ruined pile of mingled monastery and parish church which stands upon a mound at the entrance of Santiponce merits some attention, since within it is a fine altar, with some of the best statues of Montañes, and also the tombs of the good Guzman (Guzman el Bueno) and his wife.

NOTES.

THE President of the Local Government Board has issued a sensible circular to the Local Boards throughout the country, pointing out the desirability of employing artisans out of work during the winter on useful public works. The advice is sound, and it is to be hoped that Local Boards throughout the country will try to follow it. But the laying-out of recreation grounds, the making of footpaths, and so forth, is not work which is always, so to say, at hand. A great deal of the unemployed labour, too, is also very unsatisfactory. Men employed on semi-pauper labour do not work well. The President of the Local Government Board expressly points out that the wages should be below the current rate, so as to prevent competition with regular employment. But most men under such circumstances work without heart, and many, who at no time are really industrious labourers, will only make a pretence of working. Very considerable supervision is therefore necessary over work being done by this kind of labour, which renders it more costly. On the other hand, a great deal of work, useful to the community, and which will afford a livelihood to artisans out of work, may be done during the winter months if Local Boards will endeavour to attend to the business with intelligence and good feeling. It is certain that the object aimed at in this circular is most praiseworthy, and though it will, we fear, raise anticipations which cannot be realised, we yet hope it will enable a certain number of artisans who are out of work, and yet willing to work, to obtain a small wage during the current winter, to the advantage of the public.

THE proposal to take proceedings by law against the directors and contractor of the Panama Canal Company, including M. de Lesseps, is a sad downfall for the projectors of that once ambitious enterprise; but no one can be surprised at the feeling which has led to it. The light-hearted manner in which M. de Lesseps vouched for the success of a scheme the difficulties of which he had never even taken proper means to understand, and the flagrant pretence of the visit of investigation to the works, in which it is obvious that nothing was investigated, unquestionably amount to a moral obliquity in dealing with the hopes and the money of other people. Whether, however, the charge can really be consolidated into one of legal criminality seems rather doubtful.

ALTHOUGH the International Exhibition at Berlin is abandoned for the present, a competition, promoted by the "Architekten Verein," for proposals as to the locality and the plan of the site for such an exhibition, has aroused much interest. The Prussian capital has no natural site for an exhibition within its area such as Paris can boast of. The Champ de Mars of Paris is about 3·5 km. from the Tuileries, whilst in Berlin no practicable site could be found within that distance from the Royal Palace. Of the fourteen competitors, two, it is true, have tried to make suitable sites within that limit, but their proposals would involve the demolition of a fine railway station, a river harbour, and other expensive works. One of the competitors proposed using a part of the great drilling-grounds on the south side of the city, and seven selected the historical Grunewald to the west. Among the advantages of these sites might be named the agreeable landscape

surroundings and approaches by way of the finest parts of Berlin; but their distance, which varies from 7 to 14 kilomètres, tells strongly against them. Two competitors have selected sites to the east. This position can by no means claim the merit of good approach, but the ground proposed is pleasantly situated within 5 kilomètres from the Palace.

WE print among our correspondence this week a letter from Professor Roger Smith suggesting that, as the necessity has arisen for appointing a new curator to the Soane Museum, the opportunity should be taken to render the contents of the Museum more accessible to the public. If this meant the repeal of the rather eccentric regulations as to days of visiting, and leaving the Museum open every day, or on the same days of the week, all the year round, we should be quite in favour of such a change. But to take away the contents of the Museum from the house, and, moreover, to divide them, as Professor Roger Smith proposes, would be not only to throw over the obvious wish of the testator in a main point, but to very much impair the interest of the Museum. Sir John Soane evidently wished his very originally-planned house, with its collections, to remain not only as a gift to the nation, but as a kind of monument to himself, and it would be, to our thinking, unjustifiable to frustrate this intention; while to the public, part of the interest of the Museum consists undoubtedly in the house itself, and the special and individual character of the Museum consists in the house and its contents taken together, and would be destroyed if they were separated. While, therefore, we are very glad to give our correspondent the opportunity of making his suggestion, we must say that we cannot agree with it, and that we hope no change will be made in the Soane Museum, unless, as already suggested, to simplify the arrangement of days for visiting it.

WE have received particulars and some examples of a new material, or rather method, for street-paving, produced by the "Composite Block Road and Paving Company," which seems worth attention. The special points about it are that it is asphalte paving in the form of blocks or sets about a foot square, and that it is treated so as to produce a special surface different from that of the usual asphalte pavement. The blocks are cast in a mould in which is placed a grating of wood or iron which is surrounded by and embedded in the asphalte, apparently with the object of forming a filling to the slab and diminishing the bulk of asphalte. The bottom of the mould is shown with rough bits of stone or granite which become imbedded in the asphalte; this surface, lowest in the casting, being the upper one when the block is laid down; the result is an asphalte surface slightly roughened by granite or stone chips embedded in it, and it appears to form a surface which will be comparatively noiseless for wheels, though not quite so noiseless as the ordinary asphalte roadway, while affording a better foothold for horses than the latter. The advantage of having an asphalte pavement in blocks is obvious in regard to the relaying of streets, which could in that case be carried out bit by bit, with little disturbance to traffic, instead of fencing off half a street at once for repair. As to the probable cost of the method we have no information; we should expect to find it rather an expensive form of pavement; but the patentees really seem to have produced a road-surface which is comparatively smooth without being slippery.

WE have before us the annual report of Mr. Lovegrove, Surveyor to the Board of Works for the Hackney District, and that of Mr. Mason, the Surveyor to the Vestry of St. Martin-in-the-Fields. Among the special points touched on in the Hackney Report we find a comment on the disfigurement of the streets by loose paper, a nuisance which in many districts of London requires checking with a strong hand. Mr. Lovegrove says, "the sources of supply are loose paper from hoardings; tradesmen's circulars received by passers-by only to be thrown in the road, and often scattered by handfuls from a cart driving rapidly along the streets, also thrown away by tradesmen and street hawkers." Men are employed (at the cost of the ratepayers) in clearing away much of this, but shortly after clearance the street is as full of paper again. It is observed at the dust-cart shoot that often one-third of the load consists of paper. In some districts the dustmen are ordered not to take paper, this coming under the head of articles which ought to be burned in the house. Some stringent legislation on this subject seems necessary, though it must be admitted there might be difficulty in applying it. In regard to paving works we observe that the Surveyor reports favourably of concrete-paving laid in panels about the size of ordinary flagstones; the concrete-paving laid *en masse*, he reports, often shows ridges at the kerb lining, due to expansion. In the St. Martin-in-the-Fields report we note that "in consequence of increased responsibilities resting with local authorities by reason of the new Public Health Act," special regulations for the removal of refuse have been adopted, which will come into force in April next: but the nature of the intended regulations is not here stated. The new regulations for house drainage, which have been in force for nearly a year, are printed at length in the report. They seem to be thorough and practical; how far they are an advance upon the previous regulations of the district we are not aware. New regulations for vaults under footways are also given. Among other points it is mentioned that an upcast iron ventilating shaft has been carried up above the adjoining buildings to ventilate a newly-laid sewer, and property owners are exhorted to offer no opposition to the erection of these shafts, as the best means of relieving the sewers of noxious gases. It is also mentioned that the Surveyor is preparing, in accordance with instructions, a new plan of the parish brought up to date: the plan consists in a correction of the Ordnance Survey plan of 1874. It will probably require a good deal of correction, and the Surveyor will be wise to take nothing for granted on the Ordnance plan.

WHILE on the subject of sanitary district work, we may call attention to the absurd and inconvenient habit of the road-sweepers in some districts, of collecting the mud for the carts, when the streets are muddy after rain, at the corners and crossings of streets, just where it is in every one's way. Our special experience of this has been in the St. Giles-in-the-Fields district, where on one morning in a short walk along main thoroughfares, we came upon no less than four collections of mud, five or six inches deep, at street crossings, just where any one taking a straight course across to the opposite street corner would walk into it. Those who are responsible for road cleaning should see that the street sweepers collect the mud where it is most out of the way, instead of putting it exactly where it is neither wanted nor expected.

ACCORDING to *L'Architecture*, the French architects are considerably annoyed, and with reason, at the apparent intention of the Government to take the rebuilding of an important structure, the Opéra Comique, out of the direct control of the architects, by simply putting the building into the hands of a financial company to carry out according to their own ideas. There could be no worse method for securing anything worth calling architectural art in a national building, and it is to be hoped that a principle so opposed to all the best traditions of France in regard to architecture will be reconsidered. Even our own Government could hardly do worse than that.

THERE has been a great deal of architectural quarrelling in Zürich owing to successive invitations to Messrs. Fellner & Helmer, the well-known Vienna theatre architects, to design first a threatre, and afterwards an assembly-room and concert-hall for Zürich. This second commission was too much for the local architectural association, who actually petitioned the promoters of the assembly-hall scheme to select one of its members as architect instead of "strangers," and it was arranged that a well-known Zürich architect should compete with the Vienna architects, the Zürich Board of Works acting as assessors. They pronounced the plan of the Vienna architects to be the best, but preferred the design of the Zürich architect, and the promoters, preferring plan to design, gave the commission to Messrs. Fellner & Helmer. This has been followed by an apparently very ill-judged attempt of the Zürich Architectural Association to throw the Vienna architects out of court on a charge of evading some of the competition regulations. The whole story is not very creditable to the Zürich Association, who would perhaps be better employed in studying theatre-planning than in endeavouring to keep out those who have mastered it.

WE hear that Thorwaldsen's famous lion at Lucerne has suffered much from decay of the surface of the stone from the effect of weather, and that a Swiss engineer has undertaken to repair the damage with a paste of his invention, which will also render the monument proof against the action of the weather for the future. It is to be hoped that the co-operation of a sculptor is to be secured in carrying out the repairs.

CORRESPONDENCE has already begun in the daily press on the inadequate supply of gas to houses in London during fogs. An insufficient supply of gas in a house is a less serious inconvenience than the same thing in the streets. But during recent fogs some of the London streets have been enveloped in darkness, the only light to guide foot and vehicular traffic being the light from shops at irregular intervals. It should be possible for the gas-lamps in important thoroughfares to be lighted at once. On street refuges the police should be able to light them without delay. This want of immediate light in foggy weather is one of the characteristic faults of the management of the metropolis, where any weather a little out of the ordinary run is a much greater inconvenience to the public than it would be if local authorities prepared for it.

WE read in the *Daily News* that Mr. Richards has recently been engaged in cleaning the mural paintings at Marlborough House, which, being the reputed work of Laguerre, were restored by Mr. Richmond, R.A., and the late Mr. Henry Merritt. These, we presume, are the paintings, chiefly of military subjects, with portraits, described by De Foe in "A Journey through England," 1722, and which, subsequently covered over with mock woodwork, remained hidden until thirty years ago. Marlborough House was built, 1709-10, by Wren, for the great Duke upon a plot of ground leased for fifty years to his wife by Queen Anne. The Duchess (who passed her widowhood here) used to declare that it cost her husband more than 40,000*l.** Having originally ground and first floors, surmounted with a balustrade, the house, with its grounds, stands on the sites of the St. James's Palace aviary and friary, and part of the garden, taken out of the park, of Secretary Boyle. An attic has displaced the balustrade; in 1885 the two wings were raised by an additional floor. The Crown bought the property in 1817; the house was

*Opposite lived Walpole. It is said he bought up some property, by the north gate, to frustrate the Duchess's intention to make a suitable entrance from Pall Mall.

occupied by Prince Leopold for several years, and Queen Adelaide. It was then adapted for the school of Design and the Department of Practical Art, together with the exhibition of the (Robert) Vernon gallery, and some pictures belonging to the National Collection—mostly by English painters. When George IV. was Regent, he wanted to connect Carlton House, Marlborough House, and St. James's Palace by a gallery for portraits of our sovereigns and famous countrymen.

THE Lincoln's Inn Benchers have granted a building lease of the vacant plot, about 2,500 ft. superficial, on the west side of Chancery-lane, by the north end of Stone-buildings. Mr. G. St. Pierre Harris, architect, has made plans and designs for a set of offices. These will hide from view the side elevation of No. 1 in the western block of Stone-buildings, designed 1756, by Sir Robert Taylor. We understand that the Benchers possess the working drawings made by his clerk, John Leach, afterwards Master of the Rolls.* Nos. 8, 9, and 11, having served for certain Chancery offices, were raised by one floor nine years ago, and converted into chambers. About the same time No. 10, the old Six Clerks' office (also by Taylor, 1775-6), was fitted up as a drill-hall and school-of-arms for the Inns of Court Volunteers. Pepys tells us how, in his anxiety to get his patent (as Clerk of the Acts) formally engrossed "in Chancery-hand," he "was forced to run all up and down Chancery-lane and the Six Clerks' office, but could find none that could write the hand that were at leisure." In Pepys' day that office stood some yards lower down the lane, and we think on the east side. Yet in J. Long's plan of Thicket-fields, drawn in 1592, to which we referred the other day in reviewing Mr. Blott's "Blemundsbury," the "Syx Clerks' office" is clearly plotted on the west side, and opposite where the Rolls-house is now. The position shown on Long's plan agrees with the account of Sir George Buc, who says that the house in Chancery-lane which John Kedermister bought for the Six Clerks had been the town inn of the abbots of Norton, co. Lincoln, and afterwards "the house of one Herfleet, and of him it was called Herfleete's Inne; but now it is (or ought to be) called the Six Clearkes Inne, or Kedermister's Inne, of the aforesaid founder thereof." Part of Stone-buildings covers the site of the Black Friars' first settlement in London, where they abode for fifty-five years.† Next east was the inn of the bishops of Lincoln, near the Old Temple. In the plot we speak of an open flight of twelve stone steps leads down to a hollow alongside of a massive red-brick wall, standing north and south, in alignment with the middle line of Nos. 8-11, Stone-buildings, along the west side of Chancery-lane. The men have excavated an old drain, with a pointed arch, near the surface, and some privies in the hollow against a retaining wall along the lane.

THE Empire Palace of Varieties, designed by Mr. F. Matcham, and recently opened in Edinburgh, shows that such places of entertainment for the people are in demand in the provinces just as in London, where Mr. D'Oyly Carte's magnificent theatre has had to revert to Sir Augustus Harris. The Empire Palace takes the place of a circus, and stands where a similar but far less ambitious house, the old "Southminster," stood some twenty years ago. The new building shows great advance, not only on its old predecessor, but upon the present Gaiety Music Hall, the only house of the kind which Edinburgh has had till now. It will hold between two and three thousand, and is sumptuously enough "got up" to delight an audience which is probably not too critical in matters of artistic fidelity. The scheme of decoration is pleasant and harmonious in colour, if rather rough in execution, and the decorative paintings are good of their kind, though they lack architectural framing. The style adopted is sufficiently hybrid to allow considerable laxity; crescents and stars in some profusion, and modelled elephants'-heads for capitals, indicate, presumably, Oriental-Mohammedan leanings. The whole is a far-off reminder of the Eden Theatre of Paris, and it is, perhaps, to be regretted that the architect has not followed more closely the inspiration of that brilliant and able, if rather meretricious, interior. The ceiling and internal dome of the Empire Palace, moreover, would have lent themselves excellently to a genuine study of Moorish work; they might have been far more successful; a honeycomb vault rising from an intricate roof design (such as one sees all over Spain to this day) might have furnished a brilliant bit of artistic work that one greatly misses in the actual building. Externally the theatre is undeniably styleless and ugly, of brick unrelieved, and likely to foster Scottish prejudice against brick-work in general. Here again a little study of Spanish brick-work might have made a very different result. The only attempt at architectural treatment is over the principal entrance, a square box of a tower surmounted by a bulbous copper dome (with an advertisement statue on the top), the whole about as undesirable an intrusion into an Edinburgh street as could well be designed.

* Philip Hardwick, R.A., added the southern end of this block.

† In 1286 they conveyed to Henry Lacy, Earl of Lincoln, "totum locum et omnes domos nostras .... uxta Holeburne ubi prius habitare et morari consuvimus. . . ."

AS electrical work is becoming every year of more importance, we may draw attention to the prospectus of the "Electrical Standardising, Testing, and Training Institution," at Faraday House, Charing Cross-road, the object of which, in addition to the testing and standardising of electrical instruments, is to give a thorough theoretical and practical training to students of electrical engineering. The training given is a continuation of the college and the workshop system, on which subject we may quote the following remarks from the prospectus:—

"The workshop system, which is a survival of the old practice of apprenticeship, consists of placing a youth with a firm of manufacturing or contracting engineers, and allowing him to work side by side with the ordinary workman. Such a course unquestionably gives him an insight into working details that can be obtained in no other way, and when he finishes his works-course, he ought to have acquired a practical knowledge that at once enables him to earn a salary as a superior workman. Before, however, he can hope to fill higher positions, he must supplement the practical experience gained in the works by the acquisition of that theoretical knowledge which forms the basis of all modern engineering, and especially of electrical engineering.

The college system, on the other hand, consists in attendance upon lectures delivered by professional electrical engineers, and in the application to work, in the college laboratories and workshops, of the pure theory so taught The objection to such a system, as usually conducted, is this: the college workshops are never quite like real workshops where serious work has to be done, nor is the college engine room like an electricity works. The result is that, however excellently a mere college or engineering school may be conducted, the student sooner or later has to supplement the theoretical knowledge there gained by a more or less lengthy service as an improver with an engineering firm, or at an electricity works. In each system the defect is that of incompleteness, and an efficient training is only to be obtained by a proper combination of the two."

In order to combine the two systems, the Institution has put itself in relation with certain leading firms dealing in electrical supply and manufacture, so that the theoretical knowledge gained at the Institution can be applied in the workshops, while the students have further the opportunity of insight into the work carried out in the testing and standardising departments of the Institution. The lecturer on electrical engineering and on electricity and magnetism is Mr. H. Erat Harrison, whose knowledge and ability in treating his subject are well known.

IT seems that electric workmen are going to display just the same folly and ignorance of their business as we have so frequently met with among gasmen, who are supposed to know all about gas, and who will go with a lighted candle to look for a leak in a room full of gas. An inquest has just been held on an unfortunate and silly man in the employ of the House-to-House Electric Lighting Company, who was working on a cable carrying a powerful current, without the precaution of wearing his insulating gloves, which he had been warned not to work without. He was killed, and we commented on a similar case not long since; but we have no doubt there will be a good many more. It seems impossible to get the average workman to understand that a danger does not cease to be a danger because it is in connexion with his daily occupation.

HERE is a specimen of the wisdom of one of those Admirable Crichtons,—those great authorities on all things mundane and extra-mundane, the London correspondents of the provincial journals:—

"The Royal Institute of British Architects met on Monday night in London and congratulated themselves upon their meeting. They tell us that knowledge of perspective and firmness of touch are the chief pride of modern architectural draughtsmanship, features that the old builders were innocent of. Well, this may be true of our best men in the profession, but taking any large town street by street there is little to boast of in the generality of cases. Nine villas out of ten are barbarisms, and few public buildings are a salve for weak eyes. 'I speak as a fool,' but though it may be true that

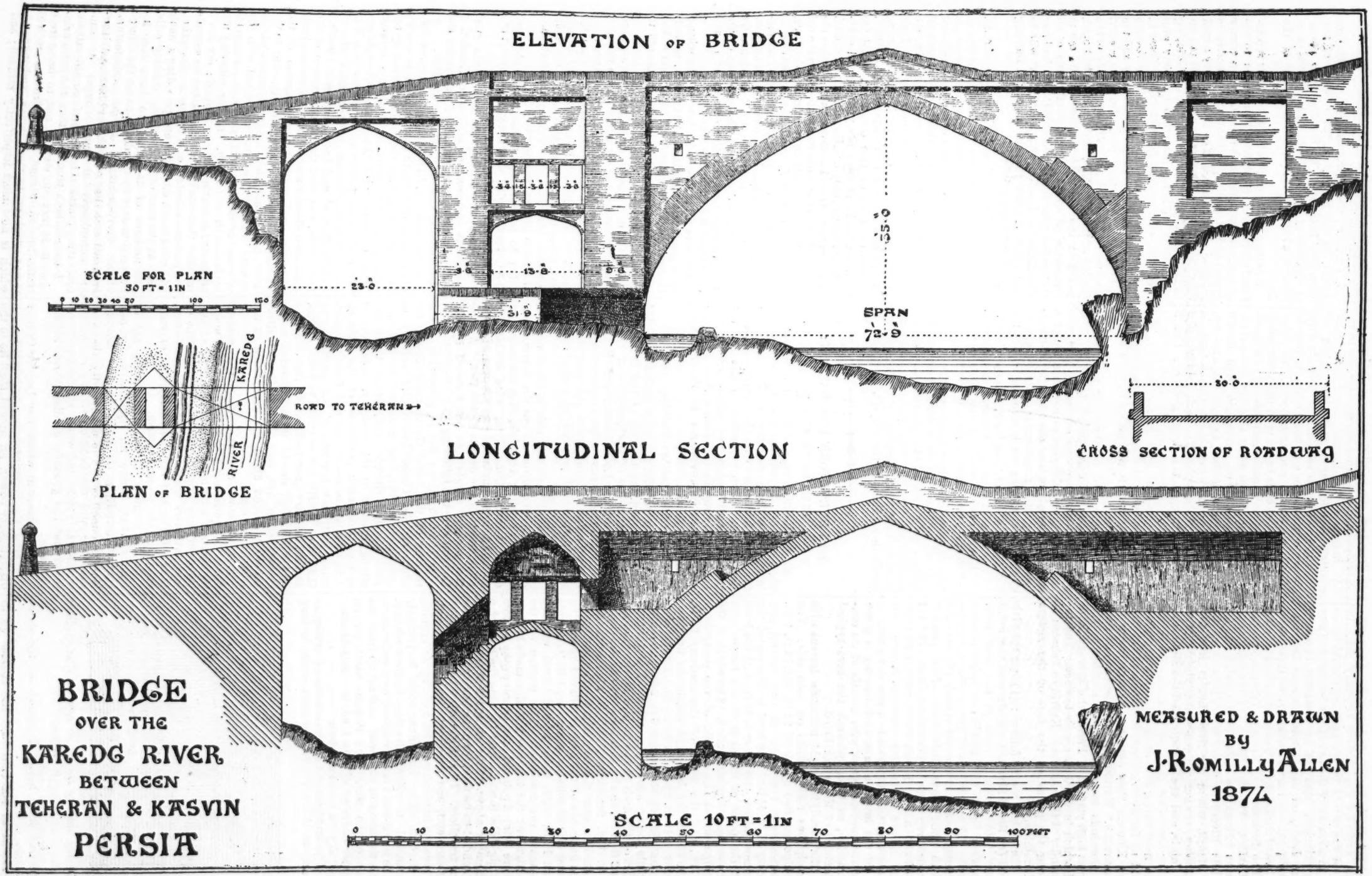
'To build, to build, it is the noblest art of all,'

what, I ask, of the jerry-builder and the average Corporation contract?"

This is the sort of stuff that passes for, and is accepted by the public as, "smart writing." We cannot correct the writer's estimate of himself,—he should be the best authority on that point,—nor can we, unhappily, controvert his assertion that "nine villas out of ten are barbarisms;" but we may enlighten his ignorance somewhat by informing him that "nine villas out of ten are barbarisms" because architects are not responsible for their design and erection; that architects do not work with "jerry" builders; and that if "the average Corporation contract" is not carried out as it should be, it is due partly to want of adequate supervision by the Corporation's officers, and partly to the penny-wise and pound-foolish parsimony of the "average Corporation,"—a policy which is too often aided and abetted by the average journalist to curry favour with the average ratepayer. It is needless to add that the President's remarks about modern architectural drawing were really in deprecation of the too great tendency in these days to rely on tricks of effect in drawing rather than on design in the true sense; but the whole passage is one bungle of ignorance. It might be as well if editors of provincial papers instructed their London correspondents to confine themselves to subjects they understood; only their letters would be so very short in that case.

BRICK BRIDGES IN PERSIA.

LIVING in England, where the art of road-making has attained so high a degree of perfection since the days of Macadam, it is difficult to realise that there are still countries, like Persia, where the whole of the traffic is conducted without the aid of wheeled vehicles of any description whatever. The great trade routes throughout Persia at the present day are simply tracks produced by the constant passing and re-passing of long strings of camels or mules carrying bales of merchandise over mountain passes and across barren deserts. In a dry climate the services of the engineer may be dispensed with for improving the roads without any very serious inconvenience to the inhabitants if they are accustomed to riding and transporting their goods and chattels by means of pack-saddles; but the crossing of rivers with strong currents is so formidable an obstacle to easy locomotion that the aid of the


ELEVATION OF BRIDGE
SCALE FOR PLAN
50 FT = 1 IN
0 10 20 30 40 50 100 150
23·0
3·6
13·8
5·6
31·9
3·6
3·6
3·6
3·6
3·6
90
15
0
SPAN
72·9
20·0
CROSS SECTION OF ROADWAY
KAREDG
RIVER
ROAD TO TEHERAN
PLAN OF BRIDGE
LONGITUDINAL SECTION
BRIDGE
OVER THE
KAREDG RIVER
BETWEEN
TEHERAN & KASVIN
PERSIA
MEASURED & DRAWN
BY
J·ROMILLY ALLEN
1874
SCALE 10 FT = 1 IN
0 10 20 30 40 50 60 70 80 90 100 FEET

engineer must needs be invoked. This, perhaps, explains the curious anomaly that in Persia the art of bridge-building should be so far in advance of the art of road-making. Thus the principal highway in northern Persia,—from Resht, on the Caspian Sea, to Teheran, the capital,—is a mere trackway, but it possesses at least four brick bridges of considerable size.

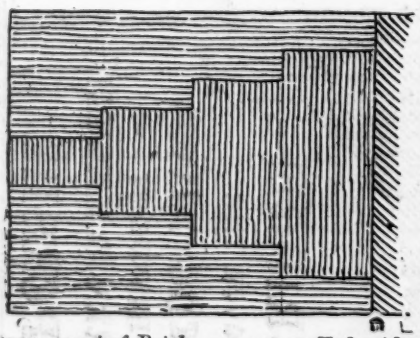
The distance from Resht to Teheran is about 200 miles. The first portion of the road from Resht follows the valley of the Sefid Rûd (or White River) in a southerly direction as far as Menjil, where the river divides into two branches, one going north-west in the direction of Tabrîs, and the other, called the Shah Rûd, going south-east towards Teheran. At Menjil the road turns, and after following the Shah Rûd as far as Patchinar, commences to ascend the Kharzân Pass over the Elburz range of mountains. Having crossed the summit level it descends towards Kasvin, situated in the great high plateau of Persia, the average level of which is 4,000 ft. above the sea. The remainder of the road from Kasvin to Teheran is along the plains at the foot of the Elburz Mountains.

The bridges are as follows: (1) over the Siah Rûd (or Black River), a tributary of the Sefid Rûd, into which it runs on the west side, between Resht and Menjil,—a single-pointed arch; (2) over the Sefid Rûd at Menjil,—seven pointed arches of unequal spans; (3) over the Shâh Rûd near Patchinar,—four pointed arches, two large and two small spans; and (4) over the Kâredj River, which runs down from the Elburz Mountains between Kasvin and Teheran, and disappears in a gravelly plain.

Of the latter, a measured drawing is given on the previous page, with details of its construction, as being perhaps the best typical specimen of those mentioned.

The Kâredj is a rapid mountain torrent with precipitous rocky banks on each side. The bridge has two spans of 23 ft. and 72 ft. 9 in. respectively, the width of the central pier being 31 ft. 4½ in. The level of the top of the parapet above the water is 42 ft., and the level of the point of the arch of the larger span above the springing is 35 ft. The width of the bridge across the outside of the parapets is 30 ft., and the width of the roadway 26 ft. The size of the bricks of which the bridge is built is 10 in. by 10 in. by 2½ in. Twenty-four courses in height measure 6 ft. 2 in., the mortar joints being about ¾ in. thick. The thinnest part of the arch in the middle is three bricks, or 2 ft. 6 in., thick. It increases to five bricks, or 4 ft. 4 in. further on, and is nine bricks, or 7 ft. 6 in., next the abutments. The weight on the haunches of the arch is relieved by making three hollow cells or chambers, 4 ft. 9 in. wide and 12 ft. high, with pointed barrel vaulting beneath the roadway. The portion of the bridge over the abutment is also made hollow, there being a pointed barrel vault at the bottom going right through, and forming the floor of a chamber above. This chamber appears to be intended to be used for a temporary living-room for travellers. It is lighted by three windows at each end, and communicates with the cells above the haunches of the arch by an opening 4 ft. 6 in. high. The inner room is probably intended to afford sleeping accommodation. The living-room is approached by a staircase in the thickness of the wall leading up from the top of the pier. The Persian name for an upper chamber of this kind is "bala-khana," literally "a house up above."

The arrangement of the courses of bricks, as seen on the soffit of the arch when looking



Arrangement of Bricks, as seen on Underside of Arch.

upwards from below, is shown on the above sketch.

It will be observed that the courses go in two directions, one parallel to the central axis of the bridge and the other at right-angles to it. This indicates the Persian method of constructing a brick arch, the chief object of which is to dispense as much as possible with a heavy centreing in a country where timber is difficult to obtain and transport. The plan generally adopted is to set up a light centreing, trussed so as to be sufficiently strong to support its own weight and a few rings of brickwork. After a single rib of bricks has been formed other bricks are dabbed against the first set, more being added next the abutment than in the centre of the arch. The arch thus becomes self-supporting as the work goes on, like a cantilever bridge, and when the span has been completely covered over in the middle, the remaining courses at each side are completed with bricks facing in a direction at right-angles to the former.

The mortar used for building in Persia is chiefly plaster of Paris called "getch." It is mixed in shallow wooden saucers by boys, who hand it to the bricklayers without the aid of a trowel. The whole time the operation of building is going on a monotonous chant is kept up by the workmen, the words being as follows:—

"Ajour bédé ajour."—A brick, give me a brick.
"Getché bédé getché"—Mortar, give me mortar.
"Getché bédé bé mân"—Mortar give to me.
"Diggêr yéké diggêr"—More, one more.

And so on with endless variations.

It is not easy to fix a date for any of the bridges in Persia in the present state of our knowledge, though very possibly historical documents exist at Teheran or elsewhere that would throw light on the subject.

THE SURVEYORS' INSTITUTION:

PRESIDENT'S ADDRESS.

Mr. C. J. Shoppee, F.R.I.B.A., President of the Surveyors' Institution, in the course of his inaugural address, delivered on Monday evening, dealt first of all with the question of town holdings, and then proceeded to speak of the proposed codification and amendment of the existing Metropolitan Building Acts and proposed street improvements in the following terms:—

The Metropolitan Building Acts.

"In common with the other bodies interested in this subject, the Council of the Institution availed themselves of the invitation of the late President of the Local Government Board to formulate their views on the subject, using as a basis the draft Consolidation Bill prepared by the Department, I presume as a *corpus vile* on which to operate.

The Council were not able to adopt some of the suggestions introduced in the Government Bill from existing Acts, but, with the assistance of a powerful Committee, were enabled to submit a large number of new proposals for the amendment of the details of the Bill. Among the general suggestions put forward by our Council were the following:—

1. The Council are not in possession of the reasons of the Local Government Board for confining the Consolidation Bill entirely to questions of building construction and the Acts relating thereto, and, unless there are strong reasons to the contrary, they are of opinion that such provisions of the existing Acts as relate to street line and frontage questions, and such portions of the provisions of the Public Health Act as relate to house drains, and all sanitary questions *within the curtilage of the building*, should be incorporated in the Consolidation Act, and that all these matters should be placed under the supervision of the District Surveyor.

2. It is most desirable that the present duality of authority with reference to the many incidents of a building should be got rid of, and that only one application and the consent of one authority should in future be necessary, thus avoiding the vexation, delay, and expense attending the present system.

3. The Council of the Institution are of opinion that, where an application for any special permission is made to the London County Council or to a local authority, the Act should require the decision to be given within a reasonable time, and where application is refused that the grounds of disapproval should be stated.

4. In all cases in which the London County Council or the Superintending Architect have a discretionary power, an appeal shall lie to the Tribunal of Arbitration constituted under the 85th section of the Act.

5. Further, the Tribunal of Arbitration should, in the opinion of the Council of the Surveyors' Institution, be invested with power to dispense in special cases with a literal compliance with the Constructive Clauses of the Act.

Whether, and if so to what extent, our recommendations will commend themselves to the authorities remains to be seen. As a purely departmental matter, without any conceivable political significance, it is to be earnestly hoped that the change of Government will not put an end to this very necessary movement for bringing our London Building Law into harmony with itself and with modern requirements. Those of us whose practice lies much in this direction are familiar with the tiresome uncertainty and the vexatious delays which result from the present confused state of the law, to say nothing of the jumble of jurisdictions; and it is to be hoped, now that the Local Government Board are in possession of the well-considered views of all the bodies practically identified with building operations in London, that a real effort will be made next Session to pass a general Building Act of some description."

The Proposed Street from Holborn to the Strand.

"Public improvements in London having of recent years become identified with proposals which go to the foundation of our system of local taxation, have been practically at a standstill since the London County Council have taken the reins of government into their hands. Their predecessors, it is computed, spent during thirty-three years an average sum of 500,000*l.* a year on work of this character, while the County Council in the three years of its existence have spent only a little more than 289,000*l.* in all on new street improvements. Unless the new Parliament is more compliant than the old one, matters are likely to remain at a deadlock, the London County Council having decided, in words somewhat lacking in grammatical precision, that they will not proceed with any new scheme 'failing provision by Parliament for some equitable division of the net cost of the improvement between the owners of ground values and the occupiers thereof.'

We have all studied with interest the scheme for a great thoroughfare, 100 ft. wide, between Holborn and the Strand. The objects of the scheme were stated by the County Council to be as follows:—

(*a*) To combine a first-class thoroughfare from Holborn to the Strand with the widening of Holywell-street and St. Mary-le-Strand.

(*b*) To open a direct thoroughfare from the north to the Strand, Fleet-street, and Temple Bar, going eastwards, as well as for the traffic towards the Strand, Wellington-street, and Waterloo Bridge, westwards.

(*c*) To improve the communication between the Covent Garden and Long Acre District and the Lincoln's Inn District.

(*d*) To open and improve one of the most insanitary and decaying quarters of London.

(*e*) To offer an opportunity for a central and commanding site for a new County Hall.

In the abstract, all will agree that a new first-class north and south thoroughfare is needed, and that the Strand should be widened by the removal of the block of buildings between Holywell-street and the main thoroughfare. We shall also, probably, be agreed that it is desirable to improve the communication between Covent Garden and Long Acre and Lincoln's Inn Fields, and that the reconstruction of the miserable district about Clare Market is in itself an object well worthy the attention of the County Council. It is not, however, clear to my mind, at any rate, that the improvement of this squalid district need be associated with the scheme for dealing with the vast commercial traffic north and south, and for relieving the congested condition of the Strand; nor am I satisfied that the new street, either as regards the position selected, or its general conception, will have much effect beyond providing a noble vista at the cost of intensifying existing evils. The authors of it appear to have been influenced unduly by the desire to use the Church of St. Mary-le-Strand as an architectural termination to the new thoroughfare, and they are accordingly in some danger of subordinating practical to æsthetic considerations.

I cannot help thinking that the main principle to be kept in view is, not to bring fresh traffic into the Strand, but to draw as much of it as possible on to the Thames Embankment, which is now most imperfectly utilised; and

for this reason I think it would be a much better plan to construct a low-level street from the foot of Surrey-street to a point about midway on the western side of Lincoln's Inn Fields, and thence by a street trending north-westwards to the north end of Little Queen-street, Holborn. The new street I propose would pass on the level from the Embankment to the northern side of the Strand, at a depth of 23 ft. below that thoroughfare, which would be carried across it by means of a bridge; thence, for about 1,350 ft., at an easy gradient of about 1 in 30, to the level of the existing roadway on the western side of Lincoln's Inn Fields. The Waterloo Bridge traffic would be provided for by a spur street on the site of Clare-street, Blackmore-street, and White Hart-street, in much the same way as is suggested in the plan of the London County Council.

Nothing, in my opinion, could be more undesirable than concentrating the immense traffic which now finds its way north and south, by a multitude of routes, upon one point, and that one of the least convenient in the already overcrowded Strand. I have examined the levels, and am satisfied that the low-level street I have suggested is practicable, and that no heavier gradient would be involved than those existing in the case of similar streets constructed in recent years in other parts of London. My plan would involve the taking of the whole block of buildings on the west side of Surrey-street, but would save the taking of the larger block between the proposed Circus in the London County Council plan and Holborn. On the other hand, it would necessitate the appropriation of the forecourts of the houses on the west side of Lincoln's Inn Fields. I know that this particular area, and that of New Inn, is somewhat sacrosanct in the eyes of the County Council, though I have a shrewd suspicion that the loss of area for recoupment by adopting the line through Lincoln's Inn Fields has quite as much to do with their aversion to that route as fear of a powerful opposition from the legal interest.

Since the foregoing paragraphs were written I learn that a modified plan has been put forward in lieu of that referred to. I have considered it, as well as the proposals of my friend Sir Whittaker Ellis, but I am still of opinion that the low-level street offers the best solution of the problem."

The London County Council as Contractor.

After dealing with the question of "betterment," strongly criticising the proposals of the London County Council on the score of their impracticability, the President referred to the Council's recent determination to become "its own builder" as follows:—

"I am afraid the present pace of the London County Council is a little trying to the nerves of many persons. We have all been somewhat startled at their latest departure in determining to do away with the contractor and become their own builders. Even the placid optimism of Sir John Lubbock was ruffled by this proposal, which any practical man will feel contains the germs of infinite trouble and risk to all concerned. I suppose it is part of the crusade of the modern *doctrinaire* against the person he is pleased to call the 'middleman,' which means in plain English every man except himself. It is impossible that a course of this kind taken by such a large potential employer of labour as the London County Council, with its particular relations to the working-class population, can have other than serious effects in raising the general standard of wages. But this is not all, or by any means the worst of it, for the evil will be intensified by the absence of the competitive element which tends to neutralise the normal ascent of wages by the improvement and the cheapening of processes, and by the devising and introduction of labour-saving appliances. Nor is even this all, for the present system of contracting ensures a careful supervision over the details of expenditure, and provides a person of means against whom a claim will lie for bad or for faulty or inadequate work. Who is to take the place of this person under the new arrangement? Are the workmen to be individually sued and compelled to make good defective work at their own expense, or is the County Council to become the middleman in place of the contractor, with this difference, that whereas the ordinary contractor is in a position of pecuniary responsibility to his employer, the new middleman (the County Council) is to be in a position of pecuniary responsibility to no one, whatever may be the general responsibility to the employer, the ratepayer? The modern cant about the middleman is, apparently, about to be put to a practical test, though it should be evident enough to men of common sense that he is a necessary link in the long chain of production and distribution. There is prevalent a confusion of thought between what are known as 'rings' (of which labour organisations, by the way, are a conspicuous example) and the intermediaries who exercise a natural and legitimate function in organising the application of labour to the needs of the community, and, by taking upon themselves the risk, define the extent of the client's outlay. Every objection that has been urged against the exercise of direct or indirect political influence on workmen by their employer is true in a tenfold degree when for the private employer is substituted a body elected under a popular franchise,—with this difference, that the pressure is not in this case from above, but from below.

There has been nothing in the past to prevent private clients from dispensing with the services of a contractor save the general conviction that by his capital, plant, skill, and accumulated experience, he performs useful functions in relation to operations lying outside the sphere of lay knowledge. The contractor, therefore, is no marauder 'gathering where he has not strawn,' but a person evolved out of the necessities and conveniences of civilised life."

After dealing with a variety of other topics, the President concluded by referring to the present position of the Institution, which in point of numbers and in other respects seems to be very satisfactory.

THE INSTITUTION OF CIVIL ENGINEERS:

PRESIDENT'S ADDRESS.

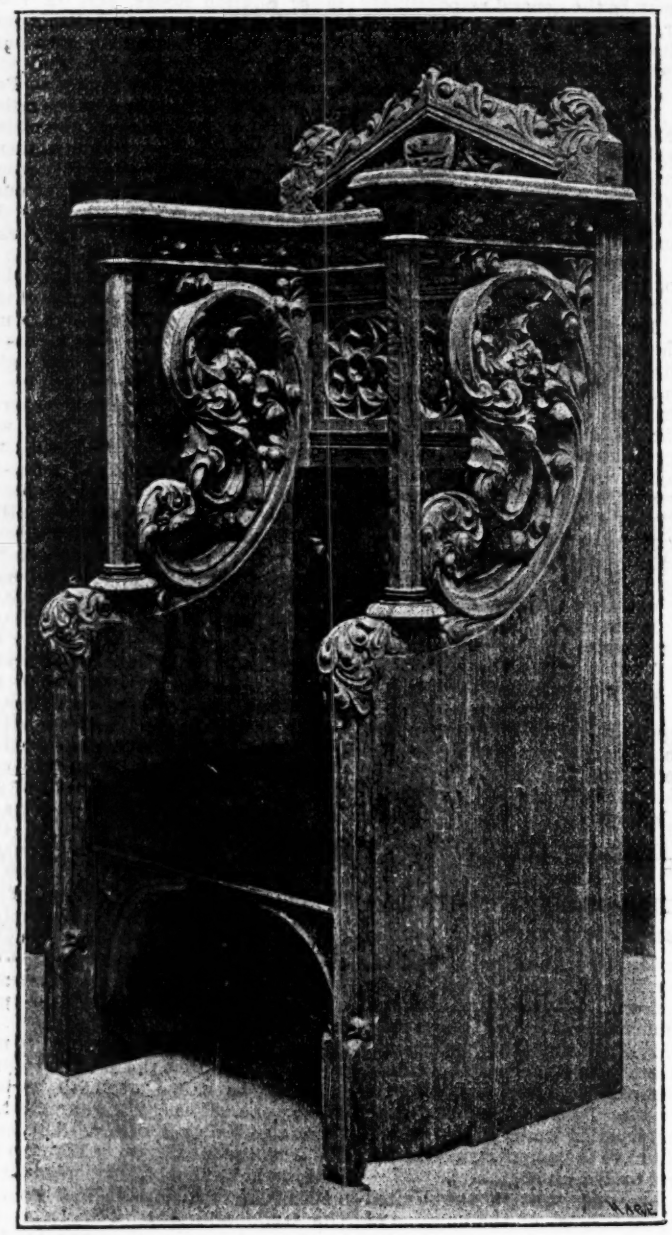
AT the first meeting for the Session 1892-93, held on Tuesday, the 8th inst., Mr. Harrison Hayter, the President, delivered his inaugural address on assuming the chair for the first time since his election. Premising that he proposed to make a departure from established custom in not dealing with past achievements, but with future prospects, the President proceeded to consider some engineering works of importance that would likely have to be undertaken in the not distant future by British engineers.

It was held by some that in the United Kingdom finality in respect of the creation of new undertakings had been almost reached. The consolidation, however, of existing works into large systems, and the consequent reduction of the rates of working expenses, enabled the corporate bodies to which they belonged to raise money at such easy rates that it became possible to construct works which had formerly appeared prohibitive on account of their magnitude and cost. Examples of such developments actually existing were cited, and reference was made to others which appeared to be rapidly achieving the condition of practical undertakings. Among them was the submarine tunnel between England and France. The President had been associated with the late Sir John Hawkshaw throughout the latter's long connexion with this project, and gave an account of the present state of the question, intimating that, in his opinion, apart from political considerations, a tunnel was perfectly feasible, and would probably cost less than one-fifth the amount necessary for a bridge. Another great project which had received considerable attention, and was likely to receive more, was the tunnel proposed for uniting the railways of England and Scotland with those of Ireland. Several routes crossing the North Channel between Wigtownshire and the Irish coast had at different times been suggested. Some of the lines proposed, would, however, cross the ravine in the sea-bed known as "Beaufort's Dyke," which was at places three miles wide, and had a maximum depth of water of 900 ft. The project favoured by the President was the one due to Mr. James Barton, M.Inst.C.E., described in a paper read before the Society of Arts by Sir Roper Lethbridge, K.C.I.E. In this case the tunnel would pass round the northern end of Beaufort's Dyke, at such a depth that no part would be nearer the bed of the sea than 150 ft. The geological features had been investigated by Professor Hull, F.R.S., whose conclusions had been confirmed by Mr. Topley, F.R.S., showing that the tunnel would pass for one-third of its length through the lower Silurian Rocks, and for the remaining distance through the Red Marls and New Red Sandstone. Other subaqueous tunnels, connecting the railways north and south of the Humber, under the Thames at Purfleet, and under the Solent to connect the railways of the Isle of Wight with those of the mainland, were referred to as likely to be undertaken in the not distant future. The successful accomplishment in twelve months of the tunnel under the St. Clair River, on the Grand Trunk Railway of Canada, had shown how these works could be speedily and cheaply carried out.

The President next considered the future of the canals and inland waterways of this country, of which there were 3,814 miles in more or less active operation. The importance of canals might be judged from evidence given before Sir Thomas Scott's Parliamentary Committee of 1883, to the effect that the average cost of canals in England and Wales was 3,350*l.*, against that of railways 46,000*l.*; the cost of maintenance of works less than one-fourth that of railways, while the cost of conveyance of heavy materials was less than one-third that of like service on railways. The neglect of canals was a matter of the most serious interest for this country, as it enabled its competitors in France, Belgium, and Holland, which countries possessed well-devised canal systems, to carry coal and heavy goods at such low rates as to greatly favour foreign competition with our own industries. It was unfortunate that exceptional difficulties had beset the construction of the Manchester Ship Canal, which might tend to retard the accomplishment of similar enterprises. Nevertheless, the President believed that the next fifty years would witness such a development of canal and river navigation as would be a fruitful source of occupation for the British engineer. Much yet remained to be done to place our harbour and dock accommodation on a satisfactory footing. The direction which developments might profitably take were discussed, and the President thought that the check under which dock enterprise was suffering was of a temporary nature only, and not due to circumstances likely to impede future dock-extension.

The President then proceeded to notice some works abroad that the British engineer might probably be called upon to undertake. Of these, one, if not the greatest, was the Euphrates Valley Railway. The length of the line from the Mediterranean Port to the Persian Gulf would be about 850 miles, and it would cost 8,500,000*l.*, or 10,000*l.* a mile on an average. The Ismid and Angora Railway, now being constructed by the Germans in Asia Minor, under conditions not very dissimilar to those of the Euphrates Valley line, had previously been tendered for by responsible British contractors, at the rate of 8,000*l.* a mile, so that the estimate of 10,000*l.* seemed not unreasonable. With reference to the urgent necessity for this railway, the opinion of Viscount Wolseley was quoted to the effect that the Suez Canal might be quickly and easily destroyed, and that "it would be perfectly ridiculous for us to depend on the Suez Canal as a line of communication with our Eastern possessions in time of war." The question had now become almost dormant in this country, but it should be so no longer, for there was danger that the work which should be undertaken by England as a political necessity, might be, and, in fact, was now partly being accomplished by others, and a note of warning might not be inappropriate. But there was another matter to be considered, rendering the engineering possession of the territory still more necessary to our country. This was the possible construction of a Euphrates Valley Navigation. Looking at the whole question in a practical light, there was no doubt that the construction of a railway from the Mediterranean *viâ* the Euphrates Valley to the Persian Gulf was necessary and urgent if we were to have this route to India in our own hands.

The President concluded by referring to the works which would still give employment to the British engineer in Asia, South and Central America, and Mexico, and in Africa, particularly Egypt, where, however, the undertakings he cited could never be realised were the country left to itself. Only those who knew what Egypt was before the British occupation could appreciate the significance of the present beneficent control. If that control were removed or weakened, Egypt would soon again become the miserable and unhappy country it was under the old *régime*.



Mayor's Chair: designed for the Corporation of Deal by Mr. H. P. Burke Downing.

THE MAYOR'S CHAIR FOR THE CORPORATION OF DEAL.

THIS chair forms the central portion of the new Corporation pew in St. George's Church, Deal; as the illustration is from a photograph taken in the workshop of the sculptor, the remainder of the work does not appear here. The pew for the members of the Corporation extends right and left of it, the back and ends being similarly richly carved in oak. The architect is Mr. H. P. Burke Downing, of London. The design gives room in the head of the chair for the ancient arms of the Corporation, but contains no other symbols. The carving of the chair has been executed by Mr. Hitch, of Vauxhall, who has well succeeded in bringing out the spirit of the design. Mr. Jas. J. Wise, of Deal, was the contractor for the general work of which this forms a part.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.

THIS Commission resumed its inquiry on Tuesday last, with the intention of sitting for four consecutive days.* The first witnesses called were the analytical experts put forward by the Companies who take their water from the rivers; and the earlier names on the list were those of Dr. Odling, Mr. Wm. Crookes, Professor W. R. Smith, Professor Ray Lankester, and Dr. Klein. The general effect of the evidence of the first three witnesses was that the pollution of the rivers was neutralised by great dilution, subsidence in flow, oxidation, the action of animal and vegetable life, and filtration; that, in case any pathological microbes (cholera or typhoid, the only two diseases known to be communicable by water) should reach the Thames (in which they have never yet been found) from the area above the intakes, the chances of their surviving natural processes in the stream and sand filtration in sufficient numbers to injure any consumer of the water were almost inexpressibly infinitesimal; that the analyses of the water of the rivers which justified these conclusions were supported by the behaviour of microbes produced by cultivation and subjected in the laboratory to conditions analogous to those that prevail in the rivers; and that therefore the rivers, excluding the first water brought down by floods, would furnish excellent water for storage to increase the total supply. The evidence of Dr. Odling covered the whole field, and he insisted successively upon the following points:—

Statistical.—1. The low death-rate of London; and its low and steadily decreasing death-rate from zymotic and especially typhoid disease. 2. The non-influence of outbreaks of typhoid or other zymotic disease in the upper-river towns and districts on the corresponding death-rates of London. 3. The non-occurrence of any local or general outbreak of typhoid or other zymotic disease in London traceable to or even attributed to the water-supply, as furnished from its present sources. 4. The substantial identity in zymotic and especially typhoid death-rate of different metropolitan districts supplied respectively with river water, and with water from deep wells. 5. The great extent of reduction now effected, and almost entire cessation likely to be effected in the discharge of untreated sewage and such-like matter into the rivers, more especially in the case of the excretal matter of persons suffering from typhoid, cholera, or choleraic diarrhœa. 6. The extreme dilution, and reduction to an almost infinitesimal proportion, of whatever amount of sewage or other like matter that still finds its way into the rivers.

Chemical.—7. The smallness of the proportion of organic matter presentin the London water supply, both absolutely and relatively to the proportion present in other town supplies; the average amount but little over a quarter of a grain per gallon, or about one part in 300,000. 8. The absence of any increase in the proportion of organic matter present in the water at Thames Ditton, over and above that present in the water some hundred miles higher up at Lechlade. 9. The fully aërated state of the river-supply of London, and the generally recognised power of well-aërated water to keep itself sweet, or effect its own purification by a process of oxidation—the exceptional views of some chemists on this point notwithstanding. 10. The recognised continuous alternate transformation by natural processes of sweet into foul and of foul into sweet matter; and, as regards river-water, the non-persistence of the small proportion of foul matter discharged into the river in its original condition of foul matter. 11. The presumably innocuous quality of the usually small proportion of organic matter present in the London river-water, and the little import for the most part of the variations met with in the proportion present. The almost continuous diminution, moreover, in successive years, of the average proportion present.

Bacteriological.—12. The presence of bacilli or microbes everywhere, and the important agricultural and purifying actions exerted directly or indirectly by certain forms of microbes. The presumably abundant charging of even sterilised water with bacilli, in its passage from the lips to the stomach. 13. The non-recognition of pathogenic microbes in London river-water, and strong presumption as to the inability of any such microbes, if finding their way into the water, to maintain their activity or even their existence therein. 14. The observed non-development and even speedy destruction of certain of such microbes, introduced purposely by way of experiment into river-water, partly by the absence of the conditions for their sustenance, and partly by their competition with the microbes proper to the water. 15. The necessarily almost infinite dispersion or dilution, and thereby reduced or destroyed potency of any pathogenic microbes, supposing them to find their way into the water and to escape speedy destruction therein. 16. The recognised innocuousness or powerlessness of pathogenic microbes, when ingested in comparatively small number, to produce disease, presumably by reason of their competition with other micro-organisms or quasi-organisms, as the leucocytes of the blood. 17. The recognised effect of filtration, as practised by the companies, in abstracting microbe life from the water, and so reducing any risk of infection to an infinitesimal minimum.

Mr. Crookes, with the object of allaying the apprehensions that had been raised by the evidence about microbes in water, produced a statement of the numbers of bacteria that had been found in air, in the soil, in aërated waters, in milk, in meat, in flour, in cheese, and in butter. In a cubic mètre of air there are from 200 on the summit of the Pantheon in Paris, to 165,000 in a badly-ventilated room, and there are many millions in small quantities of the edibles named. In the face of these appalling numbers, Mr. Crookes says, the ten to twenty bacteria per cubic centimètre in London water are insignificant, and may be regarded as a proof of supreme purity. It is a question whether deep well water is any better for being free from them, and it speedily becomes charged with them on being exposed to the air.

ON THE APPLICATION OF AN ARCHITECTURAL EDUCATION.*

LET me give you a little illustration of this. I was once engaged on a large public building, and the work had so far advanced that we had come to the staircase. It was a big one, and capable of being made a grand architectural feature. You will often find that your best opportunities for applying your art is in the interior of your building, and you will have to make the opportunities for yourself; they will seldom be offered to you. To carry out my idea I asked for some 15,000*l.* or 20,000*l.* to make it a marble staircase. This was staunchly opposed by some, on the ground of cost. "It is quite unnecessary," said they; "a good, easy, stone stair, with a handsome cast-iron railing and plaster walls is all that is required, and will look very handsome and spacious. What do you want with marble steps and balustrade, and marble columns and walls and floor? It is extravagance and waste." Well, I

* For reports of previous sittings of the Commission, see last volume of the *Builder*, pp. 418, 435, 456, 480, 503; and current volume, pp. 10, 29, 47, 71, 82, 103, 126, 298, 316, 338, 353, 375.

* By Mr. William Young, F.R.I.B.A., being the concluding portion of a paper read before the Architectural Association on the 4th inst. (See p. 379, *ante*.)

got what I wanted, and in time the staircase was completed,—and done in a way and at a cost far beyond anything the committee had ever seen or contemplated having. Soon after the work was completed I was present one evening at a reception, and met one of the leading opponents to the work, a staunch economist, on that very staircase. He came up to me with much friendly enthusiasm. "Mr. Young," he said, "this is grand. I had no idea you intended giving us anything like this, or I should not have opposed it for a moment. We are all proud of it, every ratepayer is proud of it, and not one penny of the cost is grudged." In this instance the people got what they wanted, not what they asked for; and I have no doubt that they would have been quite satisfied, and found no fault with me, if they had got instead the stone staircase, with the cast-iron railing.

Your first work you may regard as the foundation-stone of your future success. If it is well designed and well carried out,—the one will be of no use without the other,—it will bring you another, and the next may bring you two, and so on. If your first work is not a success you will have missed one of your best opportunities. How are you to make it a success? My advice is first of all let your design be thoroughly practical. We live in an age when the practical is put before everything, and is better understood and appreciated than the artistic. Notwithstanding this you should try and be something more than only practical.

Try and infuse something of the spirit of art into your work; for there is no doubt that such work is appreciated by some people when it is done, and will tell in your favour. There is a kind of erroneous notion abroad at present that if an architect is practical he is not artistic; and that if he is artistic, he is not practical. Let your work show that you are both practical and artistic. A man may be thoroughly practical, and with all his efforts he may not be able to put any artistic feeling into his work. It is no fault of his. But if you have the gift of artistic conception, it is entirely your own fault if you are not practical, for practical knowledge may be acquired,—partly in the class-room, but more in the office and the workshop, and mostly on buildings in progress. It is this combination of the practical man and the artist that will make your work a success.

A mere builder may put up a building which is sound in construction, and which may even possess the element of utility, although devoid of anything pleasing, interesting, or beautiful, if it is not actually unsightly. An architect,—if he is an architect in the true sense,—will, with the same materials and the same amount of labour, and, therefore, at the same cost, arrange his plan and construction so as to make the building interesting, pleasing, and beautiful, while at the same time it has all the elements of utility and stability. He simply adds to the bricks and mortar, and stone and labour, what Sir Joshua Reynolds mixed with his colours, "Brains, Sir."

Besides knowing everything about good and bad materials, and good and bad workmanship, your client will expect you to know all about the proper cost of his work,—and it is reasonable that he should do so. An architect should always know what his work should cost, and his estimate must be very loose indeed if he cannot find a first-class builder to do the work at his estimate. Sometimes even surveyors may go wrong, and it may be necessary for you to look after them. I remember a case, some years ago, when I had a mausoleum to build. It was a small thing, a Greek cross on plan, with a dome, and all in stone. The estimate came in about 4,000*l.*, which was much more than it ought to have been. I looked at the prices, they were not unreasonable. I, at last, got the total amount of stone in the estimate, which seemed enormous. The fault was here. So I sat down with the surveyor and went through every stone. I happened to be quite as well up in masonry as the surveyor, and the result of this was that the estimate was brought down to something like 3,000*l.* without altering the design in any way, and the work was done.

It is not interesting work, but your clients will, above all things, expect you to look after the cost of things, and advise if it is fair or not. You should have an eye to this in your education. I think myself that estimates and accounts are the *bête noir* of an architect's life. They hamper you with your designs when you are doing the work, and they come back to you when the work is done and you want to forget all about it. But nevertheless you will find it much to your advantage to be well up in the cost of things.

"Keep within your estimates" was the advice given to me when I was commencing practice by an architect who was doing a large amount of work; "that," he said, "is the way I got on. I got a name for always keeping within my estimate, and clients came to me on that account." It was excellent advice, and I pass it on to you. Years afterwards, in conversation with one of the most eminent civil engineers of the day on this same subject, he said: "If we want an extra 100,000*l.* for structural purposes we get it, for no company would take the risk of failure, after the request." That was also a useful hint, and I pass it on to you. On no account avoid asking for an extra if it is necessary for foundations or any structural purpose.

But, apart from all this, there are times when an architect is building for the future, as well as for the present, when cost must be a secondary consideration, when the first and only duty is to do the work thoroughly well. This occurs mostly in large public buildings, but also sometimes in large private buildings. Such opportunities are not to be missed or misused by questions of cost. You may save a few thousands, and spoil your work, and the generations who come after, and who have to pay their share of the cost, will blame you for not doing the best. Cost is only a question or a grumble of a day or a year; good work is appreciated for ever.

When we look at St. Paul's or Westminster Abbey, or any of the great buildings of the past or the present, we are filled with pleasure and admiration for the work, but we care not one jot whether the architect kept within his estimate or not. If Sir Christopher Wren had lowered his dome 100 ft., or omitted one of his western towers in order to reduce the cost, would we praise him for his economy, or blame him for spoiling his work? Something like this was done in a large Government building in Parliament-street, called the Home Office. I am sure it was not Sir Gilbert Scott's fault that his design was not fully carried out, and that the uncompleted corners, where cupolas were intended, are due probably to the straitened circumstances of the National purse. The Nation spends so many millions in other ways,—rails which are never laid, for instance,—that we could not afford the few thousands necessary to complete a Government building in one of the leading thoroughfares of London.

An architect is never at his best until he is designing for the future, putting his thoughts into stone to pass down to future generations, just as an author puts his thoughts in a book, or a painter on canvas. If such opportunities come in your way, you must rise to them, and to a large extent you must make them for yourself, for if the opportunity does come, it will assuredly be hampered by economics and otherwise, and it will depend on your own individuality whether the opportunity is a big success or a failure.

As well as being a servant of the British public, a true architect is also a servant,—he should be a disciple,—of the great art of architecture, which is neither English nor French, neither German nor Greek. It belongs to all countries and to all ages. It is neither Classic, nor Gothic, nor good Queen Anne, but all of them, and much more. Its aim and mission is a large one. It is not to put up a beautiful building here and there, but to make every building beautiful, both without and within, and to make all the surroundings of life beautiful. Why should not every building in every street be beautiful, and the streets and the squares themselves be made beautiful and pleasant places? It is not an impossible idea; it is not even an extravagant one; and in time I believe it will be done. It would do more to make people happy than an eight hours' day, and it is quite as attainable.

Apply your architectural education to bring about this end, not only by putting up good buildings, but by your influence, becoming in a way missionaries of your art, to teach people to love the beautiful, and create a demand for it. This is another way of serving the British public.

In all your work take Utility for your friend, and Practical Knowledge for your companion, but let the Beautiful be your only love. With this triple association, your works will serve all the useful purposes for which they are intended, and they will possess all the elements of stability and endurance, and, being pervaded with the highest quality, the beautiful will appear in them everywhere. Take with you to light you in the way of practice all the seven lamps of architecture. Take the Lamp of Sacrifice, the Lamp of Truth, the Lamp of Power, the Lamp of Beauty, the Lamp of Life, the Lamp of Memory, and the Lamp of Obedience.

But I am going, as a practical architect, to suggest to you a new lamp, which has served me, and will probably help you on your way,—the Lamp of Enthusiasm.

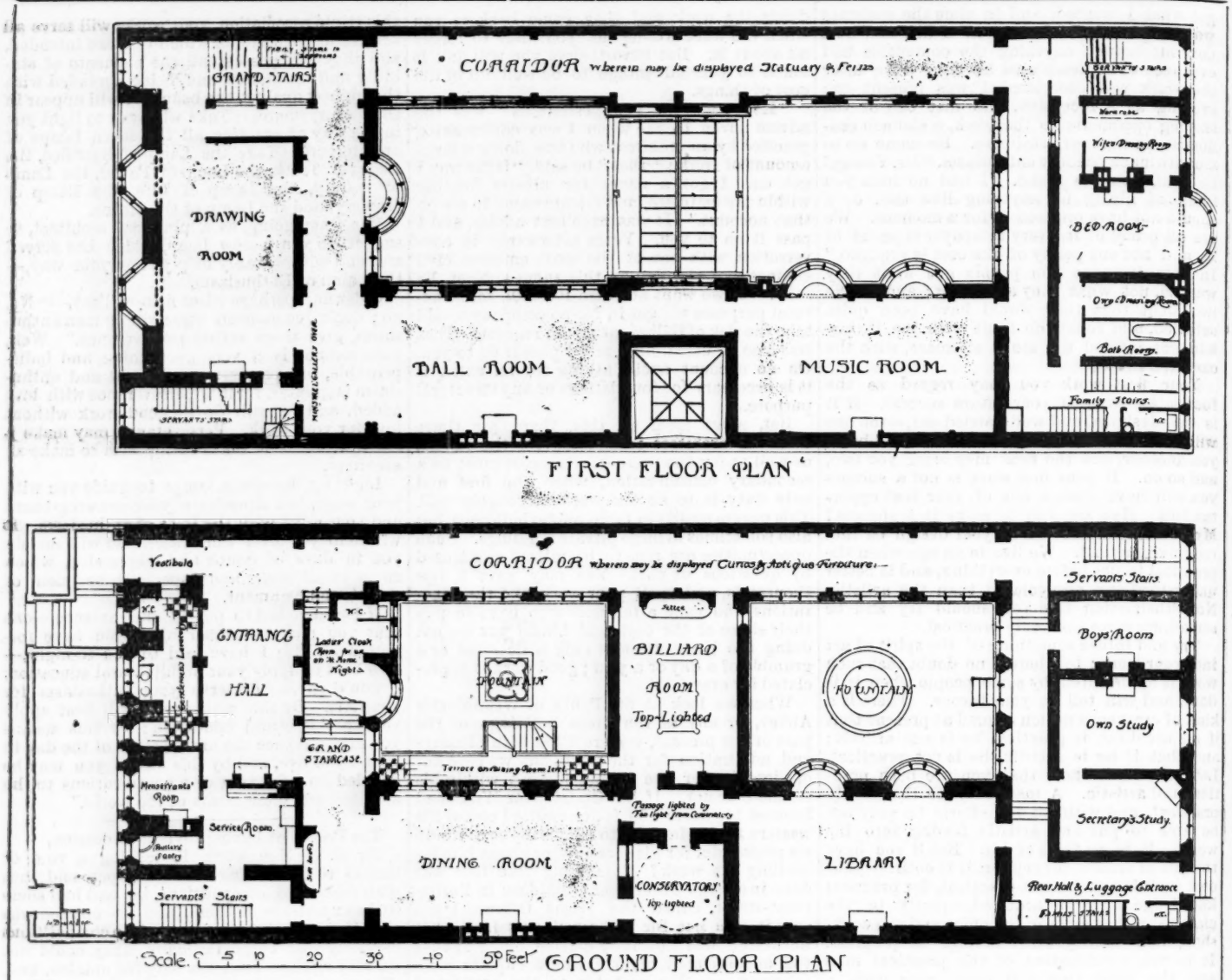
Older and perhaps wiser men will say,—"No, no; don't recommend these young men enthusiasm, give them rather perseverance." Well, perseverance is a very good thing, and indispensable, but perseverance is cold and enthusiasm is greater, for it is perseverance with love added, and you will do no good work without love for your work. Perseverance may make a surveyor,—but it takes enthusiasm to make an architect.

Light up the seven lamps to guide you with your work, but illuminate your drawing-board and your mind with the light of enthusiasm. It will help you over difficulties, and will sustain you in days of doubt and depression, which come to all men, and especially to men of artistic temperament.

If I were asked to put in one sentence,—one that you may remember when you have forgotten all else I have said to you to-night,—how best to apply your architectural education, I would say,—"Preserve your enthusiasm for your Art. By this means you will best apply your architectural education; by this means you may advance the architecture of the day in which you live, and by this means you may be enabled to add your own contributions to the architectural monuments of the world."

The President having invited discussion,

Mr. E. W. Mountford, in moving a vote of thanks to Mr. Young for his paper, said that with regard to competitions, he had had some little experience of them, and his opinion was that if young architects went into competitions carefully and enthusiastically, they could not do very wrong. That was only his opinion, and, of course, it might be a prejudiced one. When architects began practice, as a rule they had a great deal of spare time, and they might as well be trying their hands in making sets of competition drawings as sitting still doing nothing. Even if they were not successful in winning a competition, the experience that was to be obtained in making a set of competition drawings for any building could not but be very useful to them in after life when they did get some work to do; for if they went into a competition properly they must go and see other buildings, and study books bearing on buildings of the kind which were the subject of their design. No doubt, as Mr. Young had said, there must be a great deal of money lost to the architectural body as a whole by competitions, on account of the large number of designs sent in,—a number which was often altogether out of proportion to the cost of the building; but if one went to look at those designs, it would be found that out of all the drawings sent in, 75 per cent. of them had not the least chance of winning: they were so badly made; so altogether ill-considered, and so utterly feeble in every way, that one could only wonder that the authors had had the assurance to send them in. The only satisfaction was that making the drawings had been good practice for them. If they went on making competition drawings, in time they would learn to make a decent design. Of course, as Mr. Young had said, those who went in for competitions often had to contend against all sorts of local influences, which made the chances of success very much less; but he (the speaker), taking things all round at the present time, was not sure that there was very much to complain of in that respect. In these days, when professional referees were the fashion, even if the decisions were not always all that could be desired by every competitor, still the awards were made with perfect honesty and good faith. Of course there were now and then flagrant instances of local prejudice, an instance of which had occurred lately in the case of a well-known town-hall in Wales, where the first premiated design was thrown over in favour of one by a local man, who undertook to do it at 4 per cent. commission,—but even that was not



Design for a large Town House: Plans.

in England. One point which ought to be carefully adhered to, in his opinion, by all who sent in competition designs, was to have a thoroughly reliable estimate made of the cost of their designs before sending them in.

Mr. J. M. Brydon, in seconding the vote of thanks, said he thought the Association was to be congratulated on having had such a practical paper from Mr. Young. There had been a great deal of discussion of late as to whether architecture was an art or a profession, but evidently it was also a business, and Mr. Young had been preaching to them the doctrine of the business of architecture that evening. There were one or two points which struck him in the course of the paper. There was no doubt a great deal in what Mr. Young had said as to the exercise of tact and judgment in dealing with one's clients; but one very great difficulty with many young architects was to get clients at all. As to competitions, there was no doubt whatever that they had now become a matter of necessity; for any one who had any ambition to do public work there was no other way to get it but by competition. It might be regarded as to some extent a regrettable state of things that the most eminent men of the profession were not given the public work to carry out, and that it was put up to competition, so that it just became a mere matter of chance whether a good or a bad design was obtained. He quite agreed with Mr. Mountford that even if one did not win, one was repaid for his trouble by the experience gained in thinking out and making a set of drawings. There was no doubt that when they were young they were all to be found in the 75 per cent. of competitors whose designs had no chance of winning. If they went into a competition for a special class of building, it was an essential condition of success, or of even approximating to success, that they should know their subject thoroughly. He was inclined to think, with the previous speaker, that local influence was not so rampant as it was formerly. Although the professional referee was not infallible, his introduction into competitions was a great improvement on the practice which formerly prevailed. It was to be hoped that as the practice of employing referees extended, they would be more alive to their duties, and that specialists would be selected for special work. In conclusion, Mr. Brydon said he had great belief in Mr. Young's eighth lamp, the Lamp of Enthusiasm. Without enthusiasm no good architecture was ever done. It was the enthusiasm of youth which enabled them to overcome the uphill work at the beginning. Without enthusiasm they would never have any art. As Mr. Young had said, perseverance might make a surveyor; but enthusiasm was necessary to make an architect.

Mr. Sydney Vacher, in supporting the vote of thanks, said with regard to competitions that they had done a great deal for English architecture. They had enabled many young men to rise to a position which they would not otherwise have attained for many years.

Mr. E. S. Gale said that the paper had been a most instructive and suggestive one. The question of competitions was a very important one, and they had very few opportunities of discussing it. As one who had seen a good many competition designs, one thing that had struck him was that the value of a good plan would always tell. He had noticed that a good many elevations which were second-rate were recommended by referees merely because they had special merit in planning.

The President, having made a few remarks, put the vote of thanks to the meeting, which was carried unanimously, and Mr. Young having briefly replied, the meeting terminated.

Reredos, Tingewick Church, Bucks.—On the 6th inst. the Bishop of Reading dedicated a new reredos, which has been erected in the Church of St. Mary, Tingewick, near Buckingham. The reredos, which is carved in oak, has been executed by Mr. Harcourt Runnacles, of Halstead, from the designs of Mr. A. Blomfield Jackson, architect, London.

Illustrations.

THE PANTHEON, ROME.

As the important discovery in regard to the probable date of the Rotunda of the Pantheon is discussed in our leading article this week, we have thought it would be of interest to our readers to have the representation of the building before them, in order to compare it with the remarks in the article.*

DESIGN FOR A LARGE TOWN HOUSE.

This design was sent in competition for the Gold Medal of the Royal Academy of Arts last autumn. It was stated in the conditions that the plan was to be arranged with a view to the display of pictures and statuary, but that there was to be no picture-gallery. Through the kindness of the late Mr. Edwin Long, R.A., the intending competitors were invited to his house at Hampstead, where he would have shown them his arrangements for hanging pictures, and explained his views on planning. His death, however, intervened before his kind project could be carried out. Some of the competitors were thus working somewhat in the dark as to what was actually required in planning a house of this sort. The successful design was published in the *Builder* shortly after the award of the Gold Medal.†

In the design here illustrated probably the principal mistake is in making the walls opposite the light the principal ones for displaying pictures, instead of those at right-angles to it. A good room has also been sacrificed on the ground floor in order to get the gentlemen's cloak-room and lavatory and the men-servants' room near to the entrance.

The site is an unusual one—70 ft. frontage by

* It is our usual rule, in making use of a photograph, to give the name of the photographer, in order to credit him with his work; we regret that we are unable to do so in this case, not having any means of ascertaining it.

† See *Builder* for January 23, 1892.

200 ft. in depth. The author therefore presumed that the house would abut on to a street at the back, and made a luggage and private entrance that way. The grand staircase to the first floor is 10 ft. wide, and a considerable feature is made of the long corridors on the ground and first floor, which are ceiled with a wooden vault. In the perspective the point of sight is one which would be possible in an ordinary London street.

The proposed material of the elevations is Bath stone and brick, with Whitland Abbey green slate roof. A. B.

NEW TRAINING COLLEGE, NORWICH.

THE Norwich and Ely Diocesan Training College, of which we publish a view and plans this week, was opened on September 1. The cost of the college is about 10,000*l.*, and of the practising schools about 2,122*l.*, or a little over 12,000*l.* in all, which is exclusive of the amount to be expended in furnishing and laying out the grounds. The building has been carried out from the designs and under the superintendence of Messrs. Oliver & Leeson, architects, Newcastle-on-Tyne. The walls are of red brick with moulded brick bands, and the roof is covered with grey slates.

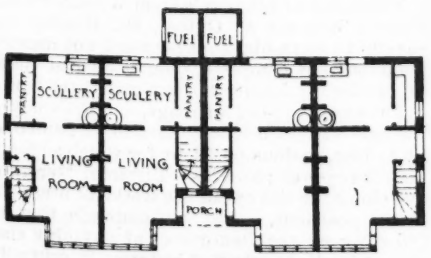
The plans show the arrangement of the building, which is considered by the officials of the Education Department as a very satisfactory example of its class.

The whole of the building, including the cubicles, is heated with hot water, and has been ventilated and arranged as to sanitation in a manner approved by the Medical Officer and the City Engineer. Especial care has been taken in regard to the drainage and supply, and no pains have been spared to make it a perfect model of what such an institution should be. Messrs. Barnard, Bishops, & Barnard have supplied the stoves and heating-apparatus; the lifts have been fitted by Messrs. Waygood & Co., of London; and the corridors and stairs have been laid in fireproof material by Messrs. W. B. Wilkinson & Co., of London and Newcastle. The builders are Messrs. J. Youngs & Son, of Norwich; Mr. J. Bayes acted as clerk of the works.

The architects wish it to be understood that in the original design the sick rooms were in a separate block completely isolated from the main building, and that they were put in their present position on the advice of Mr. Christian, who acted as assessor, and in opposition to the wishes of the architects.

VILLAGE ALMSHOUSES.

THIS is a block of four small cottages, each containing a living-room, scullery, larder, and fuel store, with two bedrooms over, and an earth-closet in the rear. The walls are to be



Plan of Almshouses.

of brickwork, the gables and roof tiled, the unglazed parts of the front bay windows roughcast.

The architect is Mr. C. E. Ponting, and the drawing was exhibited in the last Royal Academy exhibition.

DESIGN FOR OXFORD MUNICIPAL BUILDINGS.

THIS small and characteristic elevation was submitted by Mr. Halsey Ricardo in the sketch competition for the Oxford Municipal Buildings. The original drawing is executed in white touches on a dark paper, for reasons given by Mr. Ricardo below; the effect can only be partially realised in the lithograph. The drawing was exhibited at the Royal Academy of this year. In regard to his intention in the design the architect writes:—

"While trying to reproduce something of the Mediæval flavour that hangs round Oxford, my aim was to cast my design in a 'civic,' as contrasted with an 'academic' mould. Since the building will have no connexion with the University, and as the new frontage will have to stand the comparison challenged by the Christchurch front a little lower down the street, it seemed to me that the very broadest treatment was one's only hope of escaping from such challenge with architectural self-respect.

The conditions, which denied us the use of colour or shade, and commanded the one-sixteenth scale, left me, I thought, no better way of presenting my design than as a white mass on a dark background: the alternative, a dark mass on white paper, could only mislead."

ELECTRIC LIGHTING AT THE GUILDHALL.

ON Wednesday, November 16, we had the opportunity of inspecting Messrs. Lund Bros. & Co.'s installation of the electric light at the Guildhall.

The current is supplied on the three-wire system by the City of London Electric Lighting Company at a pressure slightly exceeding 100 volts.

The main switchboard is situated in the basement; the switches are handsomely mounted on it, and are arranged to break the three circuits simultaneously. On the same board two ammeters and a voltmeter are mounted, and it is interesting to note that the former read *virtual* ampères, showing that our protest of last year against the Board of Trade definition of the "alternating current ampère" has not been without effect in the commercial world. The fuses are of copper wire. Owing in part to the treble break, and in part to the subdivision of the current, these main switches are lighter in construction, easier to handle, and more elegant in appearance than is usually the case.

In the large hall there are fourteen pendant electroliers, each carrying thirty-six lamps, of which twenty-four are of 16 candle-power, and the other twelve of 8 candle-power each. There are also additional lights in the roof and in and under the band-gallery.

The lobby is illuminated with nineteen 25 candle-power lamps, for which the former gas-fittings have been adapted.

The Council-room is lighted with 137 lamps, for the most part of 25-candle-power. Seventy-eight of these are grouped in the large central electrolier, viz., sixty of 25-candle-power and eighteen of 16-candle-power; others are collected in two clusters on each side of the chair, and distributed in the galleries and corridor.

The switch-boards for the various groups are placed in moulded frames, which much improves their appearance; and the fuses are of a novel design, with spring contacts, so that they can be instantly removed and replaced. It is proposed to have telephonic communication between the various switchboards.

The library is provided with fourteen hanging lights, each containing three 32-candle-power lamps, and two rows each of twenty-eight 16-candle-power lamps near the roof, besides twelve lamps of 32-candle-power in the recesses. The light is not unpleasantly low, and is abundant in quantity, but the arrangement is less artistic than that in other parts of the building, and it will, probably, be subsequently modified. In the reading-room there are sixteen lamps suspended, each of 16-candle-power.

The installation has been recently finished, and has not yet been subjected to the official electrical tests; but it has given full satisfaction on every occasion on which it has been used, including the Lord Mayor's Banquet on the 9th inst. It is one of the few electrical installations that have been completed in the time contracted for.

The cables used have an insulation resistance of 750 megohms per mile, and the wood-casing used to conceal the wires is unobtrusive, and in harmony with its surroundings.

THE HAMBRO' SYNAGOGUE.—This synagogue, standing on the east side of Church-row, Fenchurch-street, was finally closed, after celebration of a valedictory service, on the evening of the 9th inst. Moses (or Mordecai) Hamburger built it in 1736, in the garden of his house, at what was then Magpye-alley, and it is believed to be the oldest place of worship used by German Jews, or followers of the Ashkenazi formularies, in London. The congregation will be provided with another synagogue eastwards. The present freehold site of about 3,500 ft. superficial is to be let on building lease for a term of eighty years.

ARCHITECTURAL SOCIETIES.

ARCHITECTURAL SECTION OF THE GLASGOW PHILOSOPHICAL SOCIETY.—The opening meeting of the present session of the Architectural Section of the Philosophical Society of Glasgow was held on the 14th inst. in the rooms, 207, Bath-street. Mr. Campbell Douglas, F.R.I.B.A., the President, delivered the presidential address. He remarked that he had the honour of appearing before the Section on that occasion in a somewhat unique position. This was the third time that he had had the honour of being elected President. It had been customary to review the subjects of interest common to their profession and the public, and he remembered how some time was spent lately by Mr. Thomson, the late President, in considering suggestions for the improvement of the proposed site of the new Art Galleries. Since then that matter had all been settled. There had been two competitions,—the one open to all architects, and the second to the selected few. The matter had now been settled for good or for evil. Mr. Douglas afterwards proceeded to take a historical survey of the Society, and in the course of his address dealt with many points of interest to the members.

PICKING'S INTERLOCKING FIREPROOF CONSTRUCTION.

ON Thursday, the 10th inst., a large party of gentlemen interested in fireproof construction accepted the invitation of the company formed for the purpose of putting the above system of fireproof construction before the public, to attend at the works at Bounds-green, New Southgate, for the purpose of seeing the invention put to a practical test.

The form of construction adopted is that of hollow tubes of earthenware, each of which, in normal sizes, is 6 in. wide, and 2 ft. long, and divided by a central diaphragm. On the sides of the tubes are, alternately, sinkings and projections which furnish the interlocking arrangement that is the special point of the construction.

The underside of the tubes, when used for floors, and both sides when used for partitions are prepared with dovetailed grooves for supporting the plaster, and the system has therefore the advantage of rendering lathing unnecessary; while, as the tubes rest upon and cover the ironwork, no centreing is required for the construction of a fireproof floor.

Before the actual testing, the party were conducted over the works and shown the various processes by which the tubes are prepared from the raw clay, by admixture with burnt clay ballast, pottery, &c., thoroughly ground together, and then forced through moulds by a special machine, from which it issues in the form of tubes. These are then carefully dried and burnt.

For the testing of the capabilities of the material and form of construction, small squares of the flooring had been put together and loaded so that the visitors actually saw a load of 3,125 lbs. on a 2 ft. square of the flooring without concrete, and one of 4,168 lbs. on a similar square with 1½ in. of concrete over the tubes. Other specimens were arranged in the form of partitions so as to show the capability of the invention for this purpose.

The test by fire was made in a small shed with sides and roof constructed with the interlocking tubes, which successfully resisted a fierce combustion within, so that there can be no doubt that, in this invention, the company are offering a satisfactory method of fireproof construction, albeit somewhat closely resembling other methods already before the public.

COMPETITIONS.

ABERDARE INTERMEDIATE AND TECHNICAL SCHOOL.—In the above competition, in which the assessor was Mr. Ewan Christian, we are informed that the selected design was that submitted by Mr. J. H. Phillips, architect, of Cardiff, who has been appointed to carry out the work. The estimated cost is 3,300*l.*

"BLACK AND WHITE."—Mr. Henry Blackburn (of "Academy Notes" fame) has had open for the last ten months a studio at 123, Victoria-street, Westminster, for "instruction in drawing for the press." Wednesday is "visitors' day," on which any one can see the whole collection of black and white drawings on application to the secretary.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday afternoon last at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

Buildings on Land Acquired under the Open Spaces Acts.—The Finance Committee's report contained the following paragraph and recommendations:—

"On November 8 we reported on the application of the Vestry of Kensington for a loan of 8,000*l.* to defray the cost of laying out Avondale Park, when we recommended the Council to advance 5,000*l.*, and stated that, as there was a doubt whether the Vestry could legally expend money in buildings on land acquired under the Open Spaces Acts, or provide gymnasiums or band-stands, we proposed to consult counsel on the subject. The opinion of counsel which has now been submitted to us is to the effect that, although the Court would probably construe the Acts liberally and allow an open gymnasium and band-stand, yet that the buildings erected for lavatories and conveniences, greenhouse, and caretaker's lodge were within the exception of the 5th section of the Open Spaces Act, 1881, which enacted that the land acquired was to be kept 'in an open condition free from buildings,' and were therefore unauthorised.

This opinion practically supports the view of the Council's Solicitor, and, looking to the fact that the late Board and the Council have thought it desirable to obtain special statutory power for the buildings erected on several of the open spaces under their own control, we think it would be well that a general authority should be obtained from Parliament authorising the erection of such buildings and the provision of open gymnasiums and bandstands on any land acquired and maintained as an open space or recreation ground. We therefore recommend,—

'(*a*) That the Parliamentary Committee be instructed to insert in the Council's General Powers Bill a clause authorising Vestries and District Boards and the Council to erect buildings on any land acquired and intended to be maintained as an open space or recreation ground, which may be necessary for, or conduce to the enjoyment of, the persons frequenting the same, including caretaker's lodge, lavatories, conveniences, and greenhouses, and to provide open gymnasiums and band-stands when thought desirable, and to charge the cost upon the rates of the district.

(*b*) That the Vestry be informed of the action proposed to be taken by the Council.'"

The recommendations were agreed to.

Organisation of the Parks Sub-Department.—The Parks and Open Spaces Committee brought up the following report and recommendations on this long-outstanding question,—

"We have again considered the question of the best mode of organising the Parks sub-department, which the Council on June 10, 1890, decided to form.* A recommendation to appoint a superintendent from outside at a salary of 700*l.* a year was approved by the Council, but in February last the candidates submitted to the Council were rejected, and the matter was referred back.† When we first brought up this recommendation in October, 1891, we said,—'If on advertising we again fail to find such a man, we shall bring before the Council a proposal to re-arrange the duties of the present officials, so as to obtain a uniform system of administration.' In fulfilment of this pledge we have considered the feasibility of improving the existing organisation. Mr. J. J. Sexby has hitherto, under Mr. Blashill, been the principal adviser of the Committee in all matters connected with the parks and open spaces. Mr. Nairn has been clerk of the Committee under Mr. De la Hooke; he has also had the control of the constables on open spaces, and the organisation of games and musical performances.

We propose that Mr. Sexby be placed in supreme control over all matters of administration in the sub-department, and that Mr. Nairn be transferred from Mr. De la Hooke's department to that of Mr. Sexby. Mr. Nairn will be second to Mr. Sexby, and assist him in all correspondence properly appertaining to the sub-department, and in those parts of the administrative work to which he has hitherto attended. We think that Mr. Nairn should fill a position already recognised in other departments, viz., chief clerk of the Parks sub-department. We also think that Mr. Sexby's salary should be raised from 450*l.* to 500*l.*, and that Mr. Nairn's salary should be raised from 350*l.* to 400*l.* We recommend,—

'1. That the Council do not proceed further upon its resolution to appoint a superintendent of parks at a salary of 700*l.* a year.

2. That Mr. J. J. Sexby be made chief officer of the Parks and Open Spaces sub-department, and that as such he be responsible for the due execution of all orders of the Parks Committee in relation to the parks, gardens, and open spaces of the Council, and for the management of the whole staff employed in the sub-department.

3. That Mr. Sexby's salary be 500*l.* a year.

4. That Mr. Nairn be appointed chief clerk of the Parks sub-department.

5. That Mr. Nairn's salary be 400*l.* a year.'

In order to complete the organisation of the sub-department, we think it necessary that Mr. Sexby should have the assistance of a new officer with special knowledge of horticulture. This officer, in addition to assisting Mr. Sexby in inspection of the parks, &c., and laying out new grounds, will take a portion of the work now performed by the forester,—viz., the superintendence of general labour on the open spaces. Such an arrangement will leave the forester free to exercise his proper functions of attending to trees, and will relieve him of extra duties which are already too heavy for him. We also find it necessary to make two other minor alterations in Mr. Sexby's office, as to which our recommendations speak for themselves. We recommend,—

6. That an officer be engaged at a salary of 300*l.* a year; that he be styled assistant-superintendent of works in the Parks and Open Spaces sub-department, and that he be required to possess a thorough knowledge of horticulture in parks and gardens.

7. That Mr. G. F. Barnes, who is at present in charge of the draughtsmen in Mr. Sexby's office, be designated principal surveyor in the Parks and Open Spaces sub-department.

8. That in future all works of a purely architectural or building nature be referred by the Committee to the Architect's department.'"

Mr. Grosvenor moved, as an amendment,—

"That the report be referred back to the Parks Committee with instructions to re-advertise for candidates for the appointment of a head superintendent of the Parks and Open Spaces sub-department, at a commencing salary of 700*l.* a year; the age of applicants to be limited to fifty-five years."

The amendment was rejected, as was also an amendment (moved by Mr. Harben) to make the salary of the officer mentioned in the sixth recommendation 150*l.* a year instead of 300*l.* a year, and ultimately the whole of the recommendations were agreed to.

Compulsory Acquisition of Land for Open Spaces.—The Parliamentary Committee reported as follows on this subject:—

"The Council on May 31 last referred to us the question of asking Parliament to give the Council power to acquire compulsorily, under the Lands Clauses Consolidation Acts, any land required for the purpose of open spaces. The reference, we understand, was specially made in consequence of Parliament having refused compulsory powers under a special Act to purchase the freehold of Fairseat House and grounds adjoining Waterlow Park, and the garden of Lincoln's Inn-fields. We recommend,—

'That application be made to Parliament to confer power on the Council to acquire compulsorily, under the Lands Clauses Consolidation Acts, any property required for the purposes of parks, gardens, or open spaces.'"

A long discussion arose on this proposition, consequent on an amendment, moved by Mr. Benn, to omit the words "under the Lands Clauses Consolidation Act,"—an amendment which was ultimately carried by a large majority.

After transacting other business the Council adjourned shortly after seven o'clock.

* See *Builder* for June 14, 1890.

† See *Builder* for February 20 last; p 143.

Books.

Millin et Millingen. Peintures de Vases Antiques, Publiées et Commenteés par SALOMON REINACH ("Bibliothèque des Monuments figurés Grecs et Romains"). Paris: Firmin-Didot et Cie., xiv., 136, 4°, 210 planches. 30 francs.

THIS is the second of the admirable series of volumes projected by M. Reinach. His aim is to reproduce on a reduced scale, by the help of modern processes, and at a reduced price, old archæological works which are out of print, and yet indispensable. For all but purely antiquarian purposes the new works at a third the price are twice the value, for M. Reinach adds without subtracting; he not only in this particular instance gives a preface with an interesting historical sketch of the progress of the study of Greek ceramography from the time of the first discovery of the showy Græco-Italian vases which, when published, were even touched up to suit the modern taste, down to the exact and minute scientific analysis of to-day, but he also gives,—a more difficult matter,—a list of the museums, private collections, &c., where the vases at present are, and a complete bibliography of more recent publications and elucidations of the same. We hope M. Reinach's scheme may prosper, and be extended to many other antiquated and cumbersome folios.

Die altkorinthische Thonindustrie von Dr. E. WILISCH (Beiträge zur Kunstgeschichte. Neue Folge XV.). Leipzig: Seemann, 1892.

IT is a mark of the increasing importance attached to the history of Greek ceramography that special monographs on particular periods of the art are beginning to appear. Of these periods none is more or indeed so important as that known as Corinthian, and selected by Dr. Wilisch. He began the study of the vase industry at Corinth—as he tells us in the preface—simply because he was writing the history of this ancient centre of commerce, and felt that some knowledge of one of its industries was essential to completeness. He speedily found that it was an unexpected source of light and information all round, as well as of absorbing interest in itself, and the work, begun incidentally, grew to a substantial self-contained book. It may suffice to say that though the subject is naturally approached from the historical rather than the technical side, the book is adequate as well as instructive throughout, and is essential to the student of Greek ceramography. It is but indifferently illustrated.

Outlines of Ancient Egyptian History. By AUGUSTE MARIETTE. Translated by Mary Brodrick. Second Edition. London: John Murray. 1892.

THIS is a second edition of a book we have already noticed. To it has been added a sketch-map of the Dynasties of Egyptian Kings, a list of the principal cartouches, and general notes and corrections such as are required to bring it up to date.

Correspondence.

To the Editor of THE BUILDER.

ARCHITECTURE AN ART.

SIR,—Mr. Jackson puts a very pertinent question when he triumphantly asks if we would "give an examination for literature?" Now, an examination is given for Literature, and it has been given from time immemorial, and it is an examination of which Mr. Jackson himself especially might be supposed to know something: the examination "In Literis Humanioribus."

Neither this examination, however, nor the necessary training for it, will supply, or impart, the intuitive or instinctive (art) power which alone will enable a man to become great as an author, a poet, a dramatist, an orator, or a senator. But it will give him that culture and knowledge which will effectually enable him to make the best and highest use of such instinctive, inborn power as he may be happy enough to possess.

When one of his pupils from Winchester took highest honours at Oxford, Dr. Moberly was careful to warn him that he must not consider his education complete, though he had shown an excellent capacity for pursuing it further.

The knowledge of language, and the study of the art of literature, will fit him for, and open up to him, various positions for which a literary man is required; and his "Testamur" serves as a diploma, in the eye of the world, of fitness for those positions. But to maintain that art (whether of architecture or of anything else) cannot itself be studied historically, critically, and analytically, and to hold that all such educational training in art is in vain for the education of the architect, is well-nigh denying the existence of the art altogether, and putting a serious obstacle in the way of its development. For the elements of art are to some extent of a traditional and historical nature; and the revival of literature is said to have been attained in great measure from research into, and systematic study of, early writings.

It is to be hoped that Mr. Jackson and his allies will come to see that in these matters we are not all such Goths as they apparently take us to be, if we venture to advocate the claims of education and examination in the Art of Architecture; and that they will support the Royal Institute of British Architects in its endeavour to carry out that which the Royal Academy of Arts had failed to effect. In any case, the cause of no scheme of architectural education can be furthered by the assumption of a superiority which denounces as mischievous, delusive, and puerile, the only well-initiated scheme that has as yet been advanced; unless accompanied with a well-devised superior scheme,

free from the manifold defects and imperfections attaching to all newly-established systems. Such denunciations can carry but little weight, though this assumed superiority to recognised methods may reflect a glamour of cynical and complacent contempt for such mundane teachings, which may weigh somewhat with those who do not care to look beneath the surface.

WILLIAM WHITE, F.S.A.

THE SOANE MUSEUM.

SIR,—I am sure that all who knew that accomplished and courteous architect and gentleman, Mr. Wild, will have heard with regret of his death; but I think the idea will have occurred to some that the necessity for appointing a successor may afford to the trustees an opportunity of reconsidering the whole position, and of seeing whether they cannot so discharge their trust as to make the contents of the museum of more public use; more accessible to the public, and more available to the student of architecture; and so follow the change which has come over London since Sir John Soane's day.

The contents of the museum have no doubt been duly kept and cared for, and they have been shown in a way in accordance with Sir John Soane's desires,—namely in the house which he built for their reception and for his own residence. But is it not to be regretted that such a valuable,—if not an invaluable,—national possession as a series of Hogarth's pictures, to speak of nothing else, should be exposed to the risks of fire and burglary incidental to their being shown in a dwelling-house not fireproof, and still occupied as such? If, too, the contents of the museum generally could be differently displayed it might be of much more service, as might the library.

The ideal treatment of the museum would be to abandon Lincoln's Inn-fields, to exhibit the architectural collection and house the library in the ground-floor galleries at Conduit-street, and to place the pictures in the National Gallery; and if the casts at the Architectural Museum could at the same time be moved to the same locality, namely Conduit-street, we should have a fine and instructive assemblage of objects of study brought together on the spot where they will be of most use.

Of course, there are legal and other difficulties to be overcome, but in the present day these constantly give way when some trust of old date has to be modified, in order to make the best use of the objects or the money which the trustees have to administer.

T. ROGER SMITH.

University College, London,
November 15.

SOME ANCIENT WALL-PAINTINGS.

SIR,—It may be interesting to your readers to hear something about the ancient wall-paintings recently brought to light at St. Nicholas, Harbledown, the church of the leper's hospital near Canterbury. Immediate steps being decided on for the preservation of these paintings, the most important of many here that have been uncovered from their coating of whitewash, I have had an excellent opportunity of examining the works while treating them with a preservative solution, which has, as a first result, deepened and brightened the colours, enabling one with absolute certainty to decide the subject represented to be the Annunciation.

The two figures are on opposite splays of the east window, standing under ogee canopies, and painted in black and white on a dull red ground. Flesh and draperies are alike black outlined with white, exceedingly bold and simple, and bearing no little resemblance to a rubbing from a vigorous brass. The angel to the left of the window is slightly the smaller figure, and has one wing raised, crossing behind the white nimbus; the other wing is somewhat indefinite, but turned towards the edge of the splay. There is a blank space at the right wrist as it crosses the figure and cuts off the upraised hand; this gap may indicate where once was the return of a scroll, possible traces of which occur depending by the side of the gathered robe, but there is no inscription visible to make the suggestion a certainty. The figure of the Virgin is as well-posed as the angel's; she clasps a book to her breast, and at her feet to the right is a vase of considerable size, one handle forming a conspicuous element in the design. Although there is a blank space reaching to the Virgin's elbow, here a bud and open flower put an end to all doubt as to the vase or pot holding a lily. A little to the left of the nimbus, and as though coming from the window, is the Holy Spirit in the usual form of a dove.

It seems probable that these paintings were executed in the fourteenth century, possibly soon after the chancel was rebuilt, the west end of the church, it will be remembered, being generally Norman in style.

I may mention also that the doubt as to the subject on the south wall of the Church of St. Alphege, Canterbury, seems likely to be removed, for, on treating this painting with a preservative mixture—it having shown signs lately of rapid disintegration—details have appeared which indicate that it is not, as has been supposed, a subject connected with the histories of St. Etheldreda or St. Alphege, but simply a portion of an Adoration of the Magi. This work—possibly of the early fourteenth century—was of considerable area, and evidently extended over a portion of the wall now pierced with a window.

The mural paintings in the Eastbridge Hospital, representing portions of a martyrdom of Becket, Our Lord in Majesty, and the Last Supper, discovered behind and above the old fireplace in 1879, have suffered greatly from exposure to the air and moisture since their structural restoration by Mr. Neale. These works, which have been gradually but surely fading away, have had much of their early vigour restored to them by a similar treatment to those at St. Alphege and St. Nicholas.

PHILIP H. NEWMAN.

LONDON FOG.

SIR,—In your notice of an article on the above subject in the *National Review* you state that, whilst gas fires are to be approved for cooking purposes, they are not to be tolerated in lieu of the ordinary coal fire for warming our rooms. "It means giving up the most cheering indoor object in winter."*

By my own experience I can assure you that you are mistaken. For long since I have looked upon it as the duty of all citizens to do their best to abate the evolution of smoke from their own fireplaces. I have tried many gas fires. Most of them are unsatisfactory, but their want of success is not a little to be attributed to the unsuitable grates in which the gas fires are placed.

Grates for burning coal are now better designed for that purpose than they were, but 50 per cent. of the grates used are little better than holes in the wall with coals smouldering in the hole.

To come to the gas fire, I have long since found that one of the best grates in the market is the "Marlborough" grate, made by Steel & Garland, good for coals or for gas. In this I have had placed Sugg's Charing Cross gas fire. In result I get a bright, clear cherry-red mass of radiant fuel, glowing with heat. It not only looks like, but it is as good as a glowing mass of coal, and costs 1¾d. an hour. There may be, and I hope there are, other fires as good; I only give you my experience after ten years of experiments.

Whatever joy some may find in poking a fire, the loss of it is more than counterbalanced by:—1. Entire absence of dirt. 2. Entire absence of smoke. 3. No chimneys to sweep. 4. No coals to carry. 5. No fires to be made up, or to deceive you by going out when you want them to stop in. 6. The ability to have a good fire whenever you want it, and for as long as you want it,—no longer.

SOMERS CLARKE.

LOCAL CONTROL OVER DRAINAGE AND SANITARY WORK.

SIR,—A thorough reform in the Public Health Service of the United Kingdom is very desirable. I fully agree with one of your correspondents that it is impossible for a man to have a sound knowledge of "building construction," and also to be an expert judge of the characteristics of good and bad food.

A more perfect examination than that at present held by the Sanitary Institute for sanitary inspectors is a most urgent necessity. Persons of very defective general and technical education have recently passed this examination. If the Sanitary Institute's examinations are to command the respect of men engaged in the building trade, a few leading builders and plumbers will have to be included on the Board of Examiners.

Another examination of a much higher standard should be established for those inspectors who had gained practical knowledge, and who had passed the lower grade examination. A sound knowledge of building construction should be demanded from all candidates.

C. S. I.

* That is not quite equivalent to saying they are "not to be tolerated."—ED.

HOUSE DRAINS.

SIR,—In the locality in which I reside there is a street having about fifteen houses on each side. A short time ago I received instructions from the owner of one of these houses (near the low end of the street) to make some slight alterations to the water-closet and sink; this alteration was for convenience, nothing else. During the progress of the work, the Borough Engineer came on the job, and gave instructions to the effect that I must place an intercepting-trap in the drain. This drain runs along and close to the back of the houses (not in the street), taking the sewage from all the houses on this side. This trap would, of course, cut us off from the main sewer and two or three houses below us; but there are about a dozen houses higher up that would come into the same trap. I also understand that each person on this side who does anything to his drains will have to fix an intercepting-trap also, so that in course of time the present straight line of drain will become one continuous run of intercepting-traps.

These traps (the engineer informs me) are to be made of four easy bends (in this case 9 in.), having a junction at one end to connect a pipe leading to the ground surface, so as to allow a rod to pass down and through the trap should it become stopped. All this, he says, we are compelled to do. I also understand that he speaks of disconnecting chambers as cesspools.

Will you, Sir, or some one qualified, kindly give an opinion upon the foregoing, and oblige not only others, but

X. Y.

*** If our correspondent's description of the facts is correct, the injunction of the Borough Engineer is preposterous. If each house is, by the letter of the law, to have an intercepting-trap, it should be between the house and the common drain. If there is no room for that, and if the common drain has a good fall, the intercepting-rap should be between the lowest houses and the tewer, and will do there all the good that it can do. Of course, the position is a bad one to begin with, as the common drain in such a case is practically a short length of sewer; but how any one could suppose it was to be improved by zig-zagging the whole length of the drain into a series of traps, which would be the result if the proposed system were completely carried out, it is difficult to understand.—ED.

THE EXPLOSION OF RANGE BOILERS.

SIR,—Your leading article on this subject in last week's *Builder* is without a shade of doubt correct in every particular, and, so far as the more eminent of the profession are concerned (I mean the chief architects), the advice will be ample and sufficient. But although you do not waste the pages of the *Builder* in trying to educate the jerry builder or his architect, I am sure you will not object, in the interests of humanity, to my naming a fifth cause of danger which is seldom seen to exist in other than this class of building,—viz., the expansion or air-pipe is taken up outside and exposed above the roof. The folly of this arrangement is so apparent that it may be only necessary to call attention to the fact to prevent its being repeated.

R. CRANE.

*** We should think the cases of the expansion-pipe being taken up outside the house for its whole length were very rare. Projecting a short length of it above the roof when the rest is inside the house might lead to stoppage, and the pipe should be where it can be seen; but in this climate the danger from this cause can hardly be so great as our correspondent seems to suggest; and in other respects it is the most convenient way of disposing of it. Still, the point is worth drawing attention to.—ED.

ST. PANCRAS MUNICIPAL BUILDINGS.

SIR,—Like many others of your readers, I have in response to the advertisement in your journal written for and obtained the particulars of the competition for the proposed St. Pancras Municipal Buildings.

In these we are told that "The Vestry would be advised in the selection of the premiated designs by an independent professional assessor."

So far, so good; but if the Vestry of St. Pancras really desire that "competent and experienced architects" should submit designs for their new buildings, it is imperative, in view of the experience gained by the profession as to the ways of London Vestries in previous instances, that the Vestry of

St. Pancras should state their intention of adopting the advice of their assessor, and, further, of employing as their architect the author of the first premiated design—provided, of course, that he can show to the satisfaction of the assessor that he is "competent and experienced."

Otherwise, there can be no doubt that every self-respecting, "competent, and experienced" architect will be, like myself,

A NON-COMPETITOR.

*** Our correspondent's estimate of the chances of fairplay in a Vestry-ordained competition is, we fear, only too near the mark. As a general rule we have declined to adopt the position that committees should pledge themselves to act on the recommendation of the assessor; but where London Vestries are concerned we believe this is the only condition under which any architect who values his time and his self-respect would think it wise to compete.—ED.

ORIENTATION OF CHURCHES.

SIR,—May I ask whether any ancient rule for orientation is ever followed in modern church building?

The question is suggested by the plan of Truro Cathedral, which you have just published, showing the old south aisle of the parish church of St. Mary incorporated with the cathedral.

It seems clear that the rule of the Perpendicular masons on this subject,—unless, indeed, their own work was influenced by the lines of a still older erection,—has regulated this nineteenth-century plan, so far as orientation is concerned, for the axis of the aisle of the church is parallel with that of the cathedral.

It would at all events be interesting to know, if the bearing of these axes is not due east, how many degrees it is to the north or south of that point.

J. HOUGHTON SPENCER.

Taunton, November 7.

BONE AS A BUILDING MATERIAL.

SIR,—I can give another instance of the use of bone for constructional purpose. In the stone plinth of the chancel stalls of St. Mary's, Sandwich, small bones were used as cramps. My note of this was made in August, 1881, when the construction was bared, and the cramps visible.

During the flourishing days of the whale fishery, the jawbones of the whale were often used as gate-posts. At Brighouse, West Riding of Yorkshire, there is a residence called "Bone-gate House," a reminiscence of the usage.

S. J. NICHOLL.

SIR,—In addition to the instances of bones used as a building material quoted by Mr. Blashill in your issue of November 5 (p. 360), I give the following:—

Last year, when pulling down an old house here, the builder came across an old well under the floors. This well, which was about 3 ft. in diameter, was steined by means of ox-horns, disposed round in such a way that that they crossed and overlapped, thus forming a sort of bond. The horns were of an unusually large size, and of that form which may be seen on the heads of Highland cattle; and as they were very dry and brittle, they seemed to have been in their position for some centuries. The whole lot, excepting three I managed to secure, were taken to the manure works; there were about three cart-loads of them.

W. G. WATKINS.

Lincoln, November 9.

The Student's Column.

CONCRETE.—XXI.

STRENGTH OF CONCRETE BEAMS.

WE have in previous articles given the strengths of limes, cements, and mortars, and from these the transverse strength of concrete has often been calculated, but these data are at the best unsatisfactory. Even transverse tests of mortars are not to be relied on. They are like the results obtained by Tredgold and other early experimenters on the transverse strength of small pieces of wood; the strength of beams, calculated from the results thus obtained, was always placed too high. In order to obtain an approximate estimate of the proper strength of concrete beams, we must deduce our constants from the breaking weights of similar beams. The following table gives a few results of that kind, together with the constants or co-efficients of rupture, deduced from the same according to the formula,—$W = \frac{2}{3} C \frac{BD^2}{L}$, which, being transposed, gives $C = \frac{3WL}{2BD^2}$:—

The first thing which strikes us on a perusal of the subjoined table is the great difference in the strength of the various beams. If, however, we make due allowance for the different proportions of cement and aggregate in the several concretes, and for the difference in their age at the time of testing, we find that the variation in strength is really not excessive, although doubtless sufficient to cause any calculations based on some of the highest of the constants to be viewed with a certain amount of suspicion. The dissimilarity of the results is also due in part to the fact that the experiments were carried out at different times, by different persons, with different cements and aggregates. The table will, however, prove useful, although it is not as valuable as we should have liked it to be. It is, indeed, impossible from existing data to calculate with accuracy the value of C for variously-proportioned concretes; a long series of experiments would be required before this could be done. It may be suggested that the Royal Institute of British Architects should carry out such experiments, which would find its Science Standing Committee some work to do, and would benefit the whole profession. Until such experiments have been made, architects must perforce proceed more or less empirically in the construction of concrete foundations, floors, roofs, &c. The transverse strengths of neat cement and of different mortars were given in Table XIV., page 192, *ante*. Let us turn now to the strength of beams in general.

To find the strength of rectangular beams *supported* at the ends and loaded *at the centre* we have the formula

$$W = \frac{2}{3} C \frac{BD^2}{L} \quad \ldots \quad \ldots \quad \text{(I.)}.$$

For beams *supported* at the ends and *uniformly* loaded we have

$$W = \frac{4}{3} C \frac{BD^2}{L} \quad \ldots \quad \ldots \quad \text{(II.)}.$$

For beams *fixed* at the ends and loaded *at the centre* we have

$$W = \frac{4}{3} C \frac{BD^2}{L} \quad \ldots \quad \ldots \quad \text{(III.)}.$$

TABLE XXIII.

Transverse Strength of Concrete and other Beams, supported at ends.

No.	Composition. Portland Cement.	Sand.	Aggregate.	Age in Days.	Brdth. In.	Depth. In.	Clear Span. In.	No. of Tests.	Loaded at	Average Breaking Weight. Cwt.	Reduced to Breaking W. at Centre. Cwt.	One-half* Weight of Beam between supports. Cwt.	Total Central Load. Cwt.	Constant.	Average Constant	Authority.
1	1	—	1 coke breeze	7	3	5	72	1	centre	3·85	3·85	0·31	4·16	5·99	—	A
2	1	—	2 crushed brick	*b*	12	8	60	1	,,	13·23	13·23	1·67	14·9	1·74	—	A
3	1	2 *c*	.....	90	,,	12	36	2	central 6"	155	142·06	1·55	143·61	4·48	3·88	B
4	1	2 *d*	.....	,,	,,	,,	,,	3	,,	113·33	103·88	1·55	105·43	3·29		
5	1	—	4 clean breeze	43	30	6·5	59	1	central 16"	66·32	57·32	2·12	59·44	4·15	3·63	C
6	1	—	4 broken brick	,,	,,	6	59·5	1	,,	40·52	35·07	2·53	37·6	3·11		
7	1	0	5 shingle	139	12	12	36	1	centre	85·62	85·62	1·77	87·39	2·73	—	D
8	1	1	5 ,, ...	,,	,,	,,	,,	1	,,	68·74	68·74	1·91	70·65	2·21	—	D
9	1	2	5 ,, ...	,,	,,	,,	,,	1	,,	43·61	43·61	1·84	45·45	1·42	—	D
10	1	3	5 ,, ...	,,	,,	,,	,,	1	,,	27	27	1·76	28·76	0·89	—	D
11	1	2	6 gravel	90	12	12	36	3	central 6"	46·67	42·78	,,	44·54	1·39	1·39	B
12	1	2	2 broken stone, 1½ in. / 4 ,, ,, 3½ in.	,,	,,	,,	,,	3	,,	52·5	48·12	,,	49·88	1·56		
13	1	2	6 ,, ,, 1½ in.	,,	,,	,,	,,	3	,,	40·83	37·43	,,	39·19	1·22		
14	1	0	9 shingle	95	12	12	18	1	centre	83·06	83·06	·77	83·83	1·31	1·27	D
							36	1	,,	38·33	38·33	1·53	39·86	1·24		
15	1	1	8 ,, ...	,,	,,	,,	18	1	,,	71·18	71·18	0·92	72·10	1·12	1·18	D
							36	1	,,	38·33	38·33	1·84	40·17	1·25		
16	1	2	7 ,, ...	,,	,,	,,	18	1	,,	56·16	56·16	0·94	57·10	0·89	0·94	D
							36	1	,,	30·15	30·15	1·88	32·03	1·00		
17	1	3	6 ,, ...	,,	,,	,,	18	1	,,	30·28	30·28	0·93	31·21	0·49	0·58	D
							36	1	,,	20·04	20·04	1·86	21·90	0·68		
18	1	3	6 ,, screened ...	28	21	9	99	1	central 6"	5	4·85	6·57	11·42	1·00	0 92	E
							45	1	central 12"	20·88	18·35	3·08	21·43	0·85		
							45*e*	1	,,	13·6*e*	11·92	,,	15	0·59*e*		
19	1	4	5 ,, ...	95	12	12	18	1	centre	24·91	24·91	·84	25·75	0·40	0·59	D
20	1	4	5 ,, ...	139	,,	,,	36	1	,,	23·71	23·71	1·69	25·4	0·79		
21	1†	1	½ gravel (¾ in.) ..... / 3 broken stone (1 in. to 4 in.)	182	6	12	36	1	central 12"	72	66·05	·75	66·8	4·17	—	F
22	1‡	1		100	2	2	4	2	centre	5·22	5·22	*a*	5·22	3·91	—	G

Notes to Table XXIII.

* The weight of the beam itself is part of the load, and must, therefore, be considered in the calculations, otherwise grossly inaccurate results would sometimes be obtained; *e.g.*, the weight of the first beam of the three numbered 18 is nearly three times as much as the load put upon the beam. The weight of the beam must really be considered as a distributed load, and as the stress of a distributed load is only one-half that of a central load, one-half the weight of the beam is given in the column.

† Slag cement. ‡ Roman cement.

a. Weight too small to be considered. *b*. Presumably seven days; the various ages of the beams should be carefully noted.

c. Coarse sand. *d*. Fine sand. *e*. Part of a larger beam which fell before it had properly set, and was, therefore, probably strained.

Authorities.—A, David Kirkaldy; B, John Kyle; C, Col. Crozier; D, Darnton Hutton; E, C. Colson; F, Wm. Kidd; G, Q. A. Gillmore.

For beams *fixed* at the ends and *uniformly* loaded we have

$$W = 2\,C\,\frac{BD^2}{L} \quad \ldots \quad \ldots \text{ (IV.)}.$$

For beams *fixed* at one end, *supported* at the other, and loaded *at the centre* we have

$$W = \frac{8}{9}\,C\,\frac{BD^2}{L} \quad \ldots \quad \ldots \text{ (V.)},$$

and for similar beams *uniformly* loaded we have

$$W = \frac{4}{3}\,C\,\frac{BD^2}{L} \quad \ldots \quad \ldots \text{ (VI.)}.$$

For beams *fixed* at one end only, and free at the other, and *uniformly* loaded, we have

$$W = \frac{1}{3}\,C\,\frac{BD^2}{L} \quad \ldots \quad \ldots \text{ (VII.)}.$$

These are the formulæ given by Professor Unwin, although somewhat differently expressed. It will be noticed that formulas II., III., and VI. are the same, and that the strength of centrally-loaded beams with fixed ends is 100 per cent. more than when the ends are supported, while that of uniformly-loaded beams with fixed ends is only 50 per cent. more than with the ends supported. In the former the ratio is as 100 is to 50, in the latter as 100 is to 66·6.

Prof. Anderson, in his "Strength of Materials," says:—"The increase of strength, due to secure fixing of the ends, has been variously stated" [from once-and-a-half to twice the strength when supported]; . . . . "but it is obvious that the value will depend upon so many conditions that it is impossible to say precisely what it is beforehand; it must, therefore, be considered as doubtful, unless all the conditions are known definitely; at the same time, the importance of secure fixing, wherever it can be employed, should be noted."

In the case of concrete floors, laid over the walls when these have reached the proper height, and subsequently built upon, we have a degree of fixity far in excess of that attained when the concrete is simply let into chases in the walls, or supported on corbel-courses projecting therefrom. In the former case we may base our calculations on the fact that the ends, or edges, of the floor are fixed, providing, of course, that the weight of wall above the floor is enough; but in the latter case we can only assume that the ends are to some unknown extent held in addition to being supported. It may be thought that floors resting on corbel-courses are supported, and nothing more, but this is not the case, for the concrete abuts against the walls, and is prevented by them from spreading; in this way, the floor becomes really a flat arch or (contradiction in terms) a flat dome, and may carry as much as if the ends were fixed by being built into the wall. This, at any rate, has been shown by experiment to be the case with concrete beams tested by Mr. C. Colson, and described by him in the "Proc. Inst. C.E.," vol. liv. (1877-8), part iv. Two concrete beams were formed, 9 ft. long, 21 in. wide, and 9 in. deep, supported 4½ in. at each end, the concrete being composed of 1 part Portland cement, 3 parts sand, and 6 parts screened harbour shingle. The ends of one of the beams (No. 1) were prevented from spreading by counterforts as at A, fig. 3; while those of the other beam (No. 2) were simply supported as at B. At the end of fourteen days the scaffolding under the concrete was very carefully removed, when beam No. 2 at once broke with its own weight, while beam No. 1 exhibited "no sign whatever of weakness." "After remaining unsupported for a further period of sixteen days, the beam (No. 1) was tested by placing weights on the centre. Under 0·25 ton a faint crack was observed at the centre through the whole width of the beam; with 0·635 ton it had increased as nearly as could be determined to half the depth, viz., 4½ in., and opened to about $\frac{1}{16}$ in. at the lower surface. The full extent of the fracture probably exceeded this, although not apparent on the surface. No perceptible upward extension of the fracture could, however, be detected after the imposition of the weight last referred to. The load at the centre was ultimately increased to 1·292 ton, when the beam broke. This experiment shows the necessity of guarding against the possibility of lateral movement, in the slightest degree, in the supporting girders of a floor; in this case by so doing the supporting power of the beam was materially increased. It also shows that the mass within the dotted line *a b c* (fig. 3) adds nothing to the strength of the beam when confined at the ends, as proved by the crack appearing so soon after the commencement of the loading." Three other concrete beams, of exactly similar composition to the two just mentioned, had previously been made and tested by Mr. Colson; the results of these tests are given in Table XXIII., No. 18. The average value of C for two of these beams is ·92, the ends being simply supported, while the value of C for the beam confined at the ends, if we use the formula for a *supported* beam, is no less than 2·6, or nearly three times as much. According to the usually accepted formulas for the strength of beams, fixing the ends, at the most, only doubles the strength (see formulas I. and III.), but in this case merely confining the ends effected a somewhat greater increase.

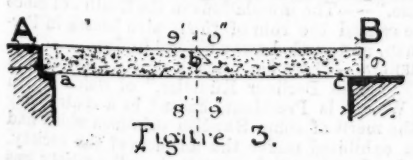


Figure 3.

If we may judge from Mr. Colson's experiment, the great compressive strength of the material enables a flat concrete beam, when the ends are simply confined, to become to all intents and purposes an arch capable of carrying as great a load as if the ends were securely fixed. This, however, needs further proof, and, until this is forthcoming, care should be taken that all concrete floors, &c., subject to transverse stresses, should have the edges as securely fixed as possible, in order that full advantage may be taken of the increase of strength which such fixing is known to insure.

GENERAL BUILDING NEWS.

New Bank Premises, Cornhill. — The new banking-house of Messrs. Prescott, Dimsdale, Tugwell, Cave, & Co. (Limited), at 50, Cornhill, was opened for business on Monday last. It is numbered 50, Cornhill, but it has been erected not only on the site of Dimsdale, Fowler, & Co.'s old bank at No. 50, Cornhill,—a modern building erected in 1859, Mr. Angell being the architect,—but the site of No. 49 as well, which was occupied by Messrs. Barraud & Lund, the chronometer makers. The lower portion of the façade consists of a bold Aberdeen grey granite arcade, the upper part being of red brick with Portland stone dressings. Practically the whole of the ground floor is taken up by the banking-hall, or telling-room, a very fine apartment, which is lighted by the great windows on Cornhill, and by a large glass dome at the rear. The walls are faced with English alabaster, with Spanish mahogany dado and cornice. The counters and desks are also of Spanish mahogany, and constitute some of the best work we have ever seen in the way of office-fittings, both as to material and workmanship. At the back of this hall is a staircase leading to the upper and lower floors, with two rooms for the directors' use. The large room is intended for the directors on duty, and commands a view of the whole of the counting-house, while the other room is of a more private character. Interesting records of the several amalgamations of the present banking firm are to be found let into the white marble mosaic floor of the great hall near the entrance. These are in the shape of the "signs" of the four different banks which have united: — Cornhill, 1762; Threadneedle-street, 1766; High-street, Bath, 1770; and Corn-street, Bristol, 1750. Between the ground and first floors is a gallery extending down one side of the banking-hall, fitted with clerks' desks, and two or three private rooms. On the first floor are the board-rooms, the secretary's offices, luncheon and waiting rooms. The upper floors will be in the occupation of the residential staff. Below the ground are two basement floors, and it is here that the strong-rooms, nine in number, are built. In the sub-basement, portions of the ancient Roman wall discovered while the excavating operations were in progress, have been preserved. The alabaster walls and the marble mosaic work have been executed by Messrs. Burke & Co.; the lifts are by Waygood & Co.; the sanitary and electric fittings by Hayward Tyler, & Co.; the strong-room doors and safes by Messrs. Chubb; Shorland's warm-air ventilating stoves are used in the telling-room; and Claridge's asphalt is used for roofing flat. The architect is Mr. Henry Cowell Boyes, F.R.I.B.A., the clerk of works being Mr. William Payne. The general contractors were Messrs. Cubitt & Co. The total cost has been upwards of 25,000*l*.

New Church, Gurnard, Isle of Wight.—The corner-stone of a church which is being erected at Gurnard, Isle of Wight, was recently laid. The site of the new building is on the main-road leading from Cowes to Gurnard. The church is to be a building of brick, in the style of the thirteenth century, the walls being relieved internally and externally by bands and patterns of coloured brick. The roofs will be tiled. The plan consists of a wide nave, arranged so that all the worshippers may have an uninterrupted view of the chancel. The latter is to open into the nave by a broad arch. On the south side will be a vestry, and on the north an organ-chamber, both opening into the church. The seats are to be open benches, and the accommodation is to be, in the nave alone, for a congregation of over 250. Provision will be made for the extension of the building at some future period. The windows will be made to harmonise with the style of the church, in brickwork of patterns, but the east window is to be of decorative tracery of stonework. A spire of timber covered with tiles will be placed over the chancel arch, and will, with its cross, rise to a height of about 62 ft. The church will be 87 ft. from east to west, by a breadth in the nave of 28 ft. The passages will be paved with black and red tiles laid diagonally. The roof will be of open timber work. The windows are to be filled in with cathedral glass of various tints of colour. The church has been designed and the works are being superintended by Mr. E. P. Loftus Brock, F.S.A., architect, of London. The builders are Messrs. Ball & Son, of West Cowes.

Equitable Assurance Offices, Manchester. —We learn that an important and costly granite contract is now on the point of completion by Messrs. James Wright & Sons, Royal Granite Works, Aberdeen, consisting of a main doorway and piers for the new premises of the Equitable Assurance Company, Manchester. The doorway is of elaborate design. Constructed of grey Rubislaw granite, it rises to a height of 15 ft. from the level of the ground. The two jambs are fully 8 ft. high, and, particularly on the front, are finished with sweeping lines of deeply-graven mouldings. On the impost or lintel, the main surface is formed by mouldings into an oblong panel, and the smaller impost is surmounted at each end by an intricately-designed pilaster, fully 3 ft. 6 in. high, consisting of a base, shaft, cornice, and a ball finial. Each of these parts is marked by deep, sharply-cut mouldings. In the centre of the space between the pilasters is a circular panel, sunk about 6 in., and surrounded by mouldings of the most intricate character. The whole is surmounted by a cornice of rich design. The whole of the work, mouldings included, is polished. The doorway is flanked on both sides by a pier of red Peterhead granite, also 15 ft. high. Each pier consists of a bottom-plinth, a shaft—with centre band,—and a massive ball-corbel, surmounted by a moulded cornice,—the continuation of the cornice over the doorway. There are nineteen of these piers, and there are about 2,500 cubic feet of granite in the job. The piers, like the stones of the doorway, are polished on all the exposed surfaces. The architects are Messrs. W. Waddington & Sons, of Burnley.

Mellison's Skating-Rink, Brighton. — Those who remember the palmy days of roller skating in Brighton will recollect that "Mellison's," at the large Concert-hall in West-street, was one of the most favoured resorts. It has now returned to its former use. According to a Brighton paper, the great hall has been entirely reconstructed. It is 162 ft. long, 46 ft. wide, and 40 ft. high to the ceiling. A room opens out of the hall, and in front of this is a restaurant, the special feature being the lowering of the floor at the entrances to the street level. The hall and restaurant are approached from West-street, on the pavement level, by two entrances, enclosed by screens and swing doors (through which the restaurant is entered), and there is also an entrance doorway in Middle-street, which will be available as a means of exit. On the first-floor level a balcony extends round three sides of the hall, reached from the hall floor level by means of three flights of stone steps, one at each entrance, and from landings on these staircases are reached the ladies' and gentlemen's lavatories. Above the restaurant and tea-room are a saloon and the kitchen, &c., communicating with the restaurant by means of lifts. Ample accommodation is provided for skate-rooms, cloak-rooom, stores, &c. The walls are built with piers, with enriched cornice and frieze, formed into bays, and the ceiling is coved and panelled in plaster, with a centre horizontal light of embossed glass running from end to end. The balcony is carried on iron cantilevers, encased in moulded plaster-work. The floor of the hall is formed of iron joists and concrete (supported by iron columns), covered with American maple in narrow width, laid with the greatest possible care so as to ensure a perfectly even and level surface, the boards being laid diagonally at each end of the hall so as to avoid friction. The lighting is by electric light by means of fourteen seven-light electroliers and eighty pendant lights under the balcony. The architect of the work was Mr. Alfred Carden, of Brighton. The contract was carried out by Mr. W. Taylor, of York-place. The electric light installation was provided by Messrs. Croggon & Co., Upper Thames-street. The balcony fence and open ironwork are by Messrs. Reed & Son.

Golf Club-house, Epsom.—This building has just been completed. It is situated close to Epsom Downs Station, and overlooks the links. It is of red brick, the upper portion being covered with red tiles. The entrance is from the verandah, which opens into an entrance-hall, 20 ft. high, surrounded by a gallery and having a timbered roof. Th dining-room is on the left of the hall; it is 30 f

long and 20 ft. wide, with a large bay-window at one side. The room is heated by two fireplaces with carved oak mantelpieces. A service passage communicates with the kitchen. The dressing-room is on the opposite side of the hall, and is fitted with lockers. There is a large lavatory, with a range of lavatory basins supplied with hot and cold water, and with two water-closets adjoining. The smoking-room is placed on the first floor, immediately over the dining-room. It is approached by an oak staircase having the club crest carved on the newel-post. The room is 30 ft. long, with a large bay window on one side and an oriel window at one end. Two French casements give access to a balcony from which a view of the play can be obtained. The room has an open-timbered roof. There are four bedrooms, which are entered from the gallery, with bath-room and water-closet adjoining. The kitchen, scullery, and servants' bedrooms are at the back of the premises. The professionals' workshop and caddies' room are under the dressing room and lavatories, and are approached by an external staircase. Wine and beer cellars are provided in the basement. The building has been designed by J. Hatchard Smith, F.R.I.B.A., London. The work has been carried out by Mr. H. Adams, builder, Sutton. The building cost about 3,000*l.*

NEW "PALACE OF VARIETIES" FOR BRISTOL.—We are informed that the designs prepared for the new Bristol Empire Palace of Varieties by Messrs. Wylson & Long, London, have been passed by the local authorities, and that a contract for the erection of the building has been arranged with Mr. Frank Kirk. The new theatre is intended to be opened next Whitsuntide. The building will be situated in the busiest portion of the city, and has been designed to be used not only as a theatre, but by a simple mechanical arrangement the stage can be removed to give place to a circus-ring.

ALTERATIONS AT SANDRINGHAM HOUSE.—The alterations at Sandringham House, rendered necessary by the fire which occurred a year ago, are, says the *Daily News*, now practically completed. That portion of Sandringham House that was destroyed by fire has been rebuilt in fireproof construction with iron and concrete floors and roofs. Various additional rooms have been added, and care has been taken to provide against further damage by fire. The rooms which were damaged have all been re-decorated. On examination it was found that considerable damage had been done by water, especially in the Princess of Wales's boudoir and the bed-rooms on the first floor, and the plastering had to be all stripped from several of them to enable them to become thoroughly dry. With the exception of the Princess's boudoir, all this work is completed, and the rooms are now occupied. The local tradesmen having expressed a desire to subscribe to some memorial of the late Duke of Clarence and Avondale, this has taken the form of a clock, which is to be placed over the ball-room entrance, and the turret has been raised to provide for this. A considerable addition has been made on the south side of the house by the erection of two additional stories over the bowling alley and billiard-room, to be called "The Bachelors' Wing." The upper story consists of servants' rooms. Separate staircases have been made to this wing, which is all of fireproof construction. The elevation of this new portion, which faces the terrace and the pleasure gardens, is faced with Carr stone, with brick and stone dressings. About eighteen new rooms have been added in all, with bath-rooms, &c. The internal woodwork is all in pitch-pine, and the whole work, as well as the furniture for the new rooms, has been designed by Mr. Robert W. Edis, architect, London. Various additions have been made to other portions of the house, in the housekeeper's and servants' departments. The general works have all been carried out by local tradesmen. Mr. Brown, builder, of King's Lynn, has done the bulk of the work, whilst Messrs. Chilvers & Ritchie, of Snettisham, have done other portions. Messrs. Homan & Rodgers, of London, have provided the fireproof flooring, Messrs. Crapper & Co. the sanitary work for the new wing, Messrs. Holland & Sons, of London, the decoration, and Messrs. Maple & Co. the furniture for the new wing. Extensive alterations and enlargements have been made to what has hitherto been known as the Bachelor's Cottage, which is situated a short distance from Sandringham House, so as to form a private residence for his Royal Highness the Duke of York. A new dining-room and several bed-rooms and offices have been added, the whole work having been carried out by local tradesmen from plans prepared by Mr. Beck, of Norwich, Colonel Edis acting as consulting architect. From the Duke of York's Cottage a new road has been constructed towards West Newton, and at its entrance a thatched lodge has been erected and large gates are being provided. A new lake, or duck-pond, of considerable area, has been excavated in the middle of the park. This is supplied with water by a stream running through the park from the old lake opposite the Duke of York's Cottage, which lake has been much enlarged. Mr. E. C. Shearman has acted as clerk of the works.

SCHOOL BUILDINGS, FALMOUTH.—A new High School has just been erected at Falmouth, at the corner of Wood-lane. The school is built with Bridgwater red brick, the style being "Queen Anne." The panels for the front bay window and porch are terra-cotta, the cornices, caps, and coping being of Bath stone. The walls are built hollow, and the roof is close-boarded and slated. A corridor runs from the main entrance to the end of the building. On the right, on the ground floor, is an assembly-room, 35 ft. by 20 ft. This room is at present used as the gymnasium. The kindergarten-room measures 20 ft. by 16 ft. Opposite is a class-room, 16 ft. by 16 ft. At the end of the corridor is a large cloak-room. The upper rooms are approached by a well-lighted staircase. There are five class-rooms, as well as a sitting-room for the assistant-mistress. Each room has a dado of varnished red pine, and is ventilated by means of Tobin's tubes and ventilators near the ceiling. The contractor for the building was Mr. J. S. Kelway. The architect was Mr. T. Wonnacott, of Falmouth.

ADDITIONS TO THE QUEEN'S HOTEL, CARDIFF.—On the 3rd inst. one section of the extensions made to the Queen's Hotel, Cardiff, was opened to the public. The portion opened consists of the main hall and bar. The latter occupies a central position in the hotel buildings, the entrance approach being a series of continuous lobbies opening into a hall. The dados of the hall and lobbies are in teak wood, the upper portions of the walls and ceilings being in Lincrusta-Walton decoration, while the floors are in mosaic. The bar is 33 ft. 6 in. long and 26 ft. wide, the height being 15 ft. The decorations are mainly in cream and gold, these having been done by Mr. Jas. Rosser, under the superintendence of Mr. Allan, the contractor. Around the bar stained glass has been used, this having been supplied by Mr. Samuel Evans, of Birmingham. The ceiling is of stained glass of floral pattern. The floor is mosaic, laid by Messrs. Pattison, of Manchester. The joint architects to the Queen's Hotel Company are Mr. J. P. Jones and Mr. C. E. Waring, the contractor being Mr. James Allan. Mr. John Evans was the foreman, and Mr. T. Alexander the clerk of the works.

SANITARY AND ENGINEERING NEWS.

SANITARY BUILDING REGULATIONS AT WEST HARTLEPOOL.—We are glad to learn that in this rapidly-increasing seaport town the Sanitary Authority is actively engaged in many schemes for the further improvement of the district, including sewerage works, street works, new abattoirs, &c. One of the most beneficial amendments, however, so far as the public health is concerned, consists in the new regulations in connexion with the erection of new buildings, which requires that each new dwelling-house erected after the present date shall have a water-closet, together with a covered galvanised pan for the reception of the dry domestic refuse. Up to the year 1884 the old open privy flourished in all its ugliness, and, so that the sewers might be made the more foul, each owner was required to cause a drain to be laid from such open ashpit to the public sewer. In 1884 a regulation was made requiring the ashpits to be covered; the bottom of the ashpit was not to be lower than the level of the adjoining street, and the drainage into the public sewer was prohibited. In 1886 a somewhat modified privy was permitted, taking up less yard space, and, therefore, restricting the amount of space for the deposit of filth. This privy comprised a movable galvanised pan, which was made the receptacle of all excrementitious matter, as well as the dry domestic refuse, and was emptied weekly. Mr. J. W. Brown, A.M.Inst.C.E., the Borough Engineer, under whose advice the new regulations have been made, has been a strong advocate for the water carriage system for many years, and he has now succeeded in inducing his Council to abolish from the district one of the most objectionable forms of storage and removal of filth.

PIER PAVILION, CLACTON-ON-SEA.—The tender of Messrs. Reed, Blight, & Co., contractors, Westminster, has been accepted by the directors of the Clacton-on-Sea Pier and Pavilion Co., for the erection of the new pavilion and sundry other works at their pier. The engineers are Messrs. Kinipple & Jaffrey, of London.

SEWAGE PRECIPITATION WORKS AT WOODVILLE.—For a long time past a stream flowing through Lord Carnarvon's property near Burton-on-Trent has, it is stated, been polluted by crude sewage discharged from the various factories situated at Woodville. A few months ago the directors of Messrs. Brunt, Bucknall, & Co.'s brewery, which produces a large volume of sewage and waste liquor, determined to set an example to their neighbours by erecting works for chemically treating the sewage. The works have been designed by Mr. Albert Wollheim, of London. The sewage can be treated either during the entire day or accumulated in a syphon tank and treated only during the several discharges of the latter, and an electrical alarm will be connected with the office to give timely warning of each discharge. A night storage tank has also been provided. The precipitation tanks are in duplicate, and can be worked either on the continuous or separate systems. The treatment will be by the "Amines" process.

FOREIGN AND COLONIAL.

FRANCE.—Now that the Bill has actually been submitted to Parliament, the reconstruction of the Opéra Comique is to be entrusted to a large contractor, on condition that the State shall guarantee a certain subvention for a specified time. Now the Société Centrale des Architectes is not pleased at this arrangement, the adoption of which will place the architect under the orders of a speculating builder, and M. Daumet has been commissioned to address a petition to the Minister of Public Instruction and Fine Arts, to protest against such a proceeding. On the other hand, the Association Amicale des Architectes, who have received diplomas from the Government, have just asked the Senate to decide the matter by competition.——The Municipal Council of Paris has just taken into consideration a proposition made by M. Létorey, architect, for the completion of the Boulevard Haussmann. The question will shortly be decided.——The Impressionist and Symbolical Painters opened their third exhibition on the 15th inst., at No. 47, Rue le Peletier.——The Luxembourg Museum has just been enriched by a fine bust in gold and ivory, entitled "Gallia"; it is the work of M. Moreau-Vauthiér.——There is an interesting collection of pastels and water-colour drawings by M. Degas now on view at the Galerie Durand Ruel.——The Director of the Carnavalet Museum has lately acquired an "Epitome de la Corographie d'Europe," printed in 1553 at Lyons, and which contains the oldest known engraving of the plan of Paris.——M. Boussard, Architect of the Minister of Posts and Telegraphs, has just given up to the Administration the new Hôtel des Téléphones, in the Rue Gutenberg.——Up to the present time, no discoveries of any interest have been made in the ruins of the Palace of Saint Cloud. The *fronton* of the right pavilion has been acquired by the Princess Clémentine, mother of the Prince of Bulgaria, and has been taken to Sofia.——M. Herpinet, architect, St. Cloud, has just sent in a notice to the Municipality of that town, that the church clock threatens to fall, and will injure several neighbouring houses if it does so. The church itself is built on beds of loam. The work of strengthening will be begun immediately, to avert a catastrophe.——The jury for the competition of painters, initiated by the Département de la Seine for the decoration of the marriage-hall of the Mairie at Montreuil-sous-Bois, has just given its judgment. The commission for executing it, amounting to 21,000 francs, has been awarded to M. Bourgonnier; the second prize has been given to M. Henri Martin, and the third to MM. Gorguet and Courtois.——There is a question of giving to the town of Valence (Drôme) which is his country, the statue of the poet Emile Augier, instead of erecting it in Paris. It is to be paid for by public subscription.——The Lyons Society of Fine Arts will open its sixth annual exhibition on February 24 next, in the Pavilion of Fine Arts in the Place Bellecourt. This exhibition is open to foreign artists as well as to French.——The Exhibition of Fine Arts at Monaco will be open from December 1 to April 15 next, that at Nantes from February 1 to 28.——A narrow-gauge railway will shortly be made in the Haute Marne, between Fayl-Billot and the station of Charmoy.——The restoration of the old church of Souillac will shortly be undertaken. It is a "historical monument" of much interest.——M. le Capitaine Place has just submitted to the examination of the Academy of Sciences an apparatus which is to discover flaws in the interior of blocks or beams of iron or other metal employed in construction, and which might be the cause of sudden failures. He calls his apparatus the "Schiséophone."——The inundations in the South of France have caused the ruin of thirty-nine houses in Perpignan, and carried away several bridges.

BERLIN.—There has been a serious disruption in the "Verein Berliner Künstler," of which Anton von Werner is President, caused by a controversy on the merit of some Swedish paintings which had been exhibited under the auspices of the society. The incident is much regretted, as the society was very popular as the promoter of the Berlin International Art Exhibitions, and other successful enterprises.——Another of the series of new churches has been opened with much ceremony. This one is situated in the poorest district of Berlin. Half the cost of its erection was defrayed by the Royal family.——Berlin is to have a new Municipal Hospital, with 800 beds. This will be the fourth modern structure of the kind in the Prussian capital. It will be situated to the north of the city. The "Urban" hospital, which was completed last, is in a southern suburb.——Much pleasure is expressed by our German contemporaries that the Malmö Harbour Competition has resulted in Herr Kummer, of Dantzic, obtaining the first premium, and a Brunswick firm of civil engineers obtaining the second. The third premium went to Sweden. The proposed harbour works are very extensive.

DENMARK.—There appears now some probability of the next Rigsdag voting funds for the commencement of the rebuilding of the Christiansborg Palace, which was burned down in October, 1884. Meanwhile, two committees have been at work collecting national contributions towards the undertaking, and a sum of 60,000*l.* has been collected for

that purpose.——The work of constructing the new Art Industrial Museum in Copenhagen has been entrusted to Professor Klein.——The foundation-stone of a Catholic Orphan Asylum was laid the other day in Copenhagen.——The cost of the new Copenhagen Town Hall, which is to be built from a design by the architect Nyrop, will be about 225,000*l.* His designs have been severely criticised even by his own *confrères.*——The work of excavating the ruins of the historical château of Vordingborg are being continued, but nothing of consequence has been discovered. ——It has been decided to preserve the ruins of Östermarie Church, in the island of Bornholm, in the Baltic, as a national memorial. The church is of special interest, differing from other ancient churches in Scandinavia in having had the roof covered with sandstone tiles.——New plans have been prepared by the Ministry of the Interior for the restoration of the celebrated Ribe Cathedral, Jutland.——The Ministry also proposes the acquisition and restoration of another edifice equally celebrated in Danish history—viz., the so-called Helligaandshus (the House of the Holy Ghost) in Randers, Jutland.

VIENNA.—The memorial-stone over the late Von Schmidt's grave, in the Central Cemetery, has been placed in position with some ceremony in the presence of the representatives of the municipality and of the architectural and allied art societies. The stone bears the simple inscription, "Here lies a German mason."

SWEDEN.—The foundation work upon the new building for the Academy of the Fine Arts in Stockholm has been carried on with great activity during the summer. About 1,800 piles have already been driven down into the soil, and the laying of the foundations has commenced. It is hoped to have the building roofed-in by the autumn of 1893. The work is being carried out by Prof. F. G. A. Dahl.——A curious building dispute has arisen in Stockholm. Prince Oscar Bernadotte, second son of King Oscar, having bought a house, desired to have several structural alterations made which were against the regulations of the City Building Board, and that body refused to sanction them. The Prince then appealed to "the king" to be permitted to make these alterations, and "the king" has granted his son's "prayer."——Two monumental buildings will shortly be added to "modern Stockholm." One is situated on the fashionable Strandväg, and is being built by Herr John A. Nordström, architect, and the other is in the quarter called Triton. The latter will have four stories, and be an annexe of the well-known Petersenska Mansion. Both mansions will be constructed with shops on the ground floor and residential flats above.——An aquarium, the first of its kind in the city, has been constructed in Stockholm.——The electric light has been introduced into the Stockholm Town Hall.—— In the town of Linköping the Railway Pension Office has decided upon erecting forty model dwellings for railway servants.——A new church, Gothic in style, and designed by Herr Arvidius, will shortly be added to the public buildings of the City of Malmö.——The Crown has sanctioned the taking of limestone from the Borghamn quarries for the restoration of the ancient and historical Vadstena Cloister Church. —— A movement is also on foot for the restoration of the Sigtuna Church, on Lake Mälaren, near Stockholm, one of the oldest ecclesiastic structures in Sweden.——A new hospital has been completed in the town of Orebro, its cost being 300,000 Kr.——For the great new harbour works to be carried out in the port of Malmö, fourteen designs have been received from various engineering firms, some being English.—— It is proposed to construct a so-called "free" harbour in Stockholm.——The first electric railway in Sweden is being constructed from Stockholm to a suburb.——A monument of hewn granite is to be erected in the province of Jämtland, in memory of the soldiers of Charles XII. who fell in his war against Norway. It is from a design by Herr F. Boberg, architect, and will be executed by him.

ROUMANIA.—The Roumanian Government is inviting tenders up to May 1, 1893, for the construction of a new central railway station and offices in Bucharest. There are three premiums, of 100,000 francs, 30,000 francs, and 15,000 francs. The Government has also under consideration a scheme for the construction of new docks at Constantza (Kustendje), the cost of which is estimated at 60,000,000 francs, and the time of construction at eight to nine years.

BREMEN.—At Bremerhafen a costly extension of the old harbour works is to be taken in hand. The expenditure will be about 800,000*l.* There will be about 2,000 ft. of new embankments, and a new lock having a length of about 650 ft. The North German Lloyd Shipping Company will contribute 20,000*l.* annually in extra harbour rates.—*Hamburg Boersenh*

PUBLIC IMPROVEMENTS, TODMORDEN.—On the 27th ult., Mr. Frederick Herbert Tulloch, A.M.Inst.C.E., a Local Government Board Inspector, held a public inquiry at Todmorden, relative to the Local Board's application for sanction to borrow 4,000*l.* for Walsden sewerage, 1,600*l.* for improvements to the Town Hall, 1,000*l.* for painting and decorating, and 600*l.* for heating and ventilation. No opposition was offered.

MISCELLANEOUS.

CANTOR LECTURES, SOCIETY OF ARTS.—The following courses of Cantor lectures will be delivered during the coming session of the Society of Arts:—Professor Vivian Lewes, "The Generation of Light from Coal Gas, and its Measurement," on November 21, 28, December 5, 12; Dr. J. A. Fleming, "The Practical Measurement of Alternative Electric Currents," on January 30, February 6, 13, 20; Professor W. Chandler Roberts-Austen, C.B., F.R.S., "Alloys," March 6, 13, 20; Mr. Lewis Foreman Day, "Some Masters of Ornament," April 10, 17, 24, May 1; Mr. C. Harrison Townsend, F.R.I.B.A., "The History and Practice of Mosaics," May 8, 15.

PROPOSED DEMOLITION OF RYDER'S-COURT.—At a special meeting of the members of the Strand District Board of Works last week, at the offices, Tavistock-street, Covent Garden, Mr. W. G. Lemon in the chair, Mr. H. Cooper introduced a largely-attended and influential deputation of tradesmen and inhabitants of the parish of St. Anne's, Soho, praying the Board to undertake the widening or rather removal of Ryder's-court, Coventry-street, and the substitution of a roadway therefor, as the court had been for years in a dilapidated condition, and was a disgrace to the locality, morally and socially. The cab traffic had largely increased since the opening of two theatres in the neighbourhood, and the danger arising therefrom would be still further increased by the opening of another new theatre in Cranbourne-street. The Marquis of Salisbury was the ground-landlord in the locality, and as the leases in the adjoining Earl's-court would soon fall in, most of them having already expired, the deputation did not anticipate any difficulty in coming to terms, or in carrying out this which they considered not only a local or mere parochial but Metropolitan improvement, in the interests, as their spokesman remarked, of morality, sanitation, and public convenience, for, he said, its proximity to Leicester-square did not improve its character for purity or salubrity. The deputation, in support of their views, quoted from a "Note" in the *Builder* of November 5 on the locality; and in answer to a question from the Chairman, a member of the body informed the Board that the Marquis of Salisbury had been approached a few years ago on the subject, but no action was taken. After a long discussion, Mr. Cooper moved that the subject be referred for consideration and report to the Works and Improvement Committee. This was agreed to. The deputation, who promised to supply the Board in the interim with plans and the fullest information possible as to the property complained of, thanked the Board, and withdrew.

A COMPENSATING ADVANTAGE OF FOG.—Although all are agreed that fogs and mist constitute a pest which must be got rid of, there remains one compensating advantage which has often been overlooked. It is reasonable to suppose that a fog effects a partial purification of the atmosphere. This is borne out by the fact that when a fog subsides the deposit contains the carbon, sulphur, organic bases, and other injurious and irritating particles which formerly existed in a state of suspension in the atmosphere. Just as water is freed from objectionable suspended matter by the addition of an impalpable powder, or a mixture which gives rise to a fine precipitate, so probably is the air deprived of suspended impurities by the subsidence of the moisture particles in which the impurities become entangled. It is a matter of common observation that the air is remarkably clear after the subsidence of fog or mist. Wind or rain are, however, equally effective and much more agreeable agents in accomplishing this purification. If we cannot get rid of mists while we are beset with the peculiar conditions which characterise the climate of this country, we can at least make an attempt to prevent the emission of those particles into the air which convert that mist into the intolerable and irritating vapour ever known and remembered as London fog. —*Lancet.*

NEW HARBOUR AT LIBAU. — Active work is in progress on the great new naval harbour, a "second Cronstadt," which is being constructed at Libau. It will be situated 3 or 4 kilomètres to the north of the present port, and will be encircled by huge breakwaters. A canal 10 kilomètres in length is being constructed, leading to an arsenal to be established there. Some 5,000 men are at present engaged on the work, chiefly in making concrete blocks for the breakwaters and placing them in position.

ST. STEPHEN'S, VIENNA.—The interior of St. Stephen's Cathedral, at Vienna, has been fitted with the electric light, and the first experimental lighting took place a few evenings ago. The greatest length of the church is 350 ft., its greatest width 220 ft., and twelve large arc lamps of 1,000 candle power each, hung about midway between floor and vaulting, are distributed over this area, giving an even and considerably stronger light than the old gas coronæ hitherto in use. The effect is said not to be an artistic success, as the contrast of light and shade is almost entirely destroyed; on the other hand, the details of the higher portions, especially the elaborate tracery on the vaulted roof, the upper mouldings and capitals of the arches and shafts, and the brackets carrying the statues on the piers, are now seen more clearly than by the brightest daylight. Such portions of work, however, as are well below the arc lights,—the organ loft, pulpit, monuments, and the *baldacchini* of the altars,—are said to be much improved in effect by the new means of lighting.

COMPETITION FOR A STATUE TO COUNT ANDRASSY.—A committee has been formed in Vienna with the object of erecting an equestrian statue of Count Andrassy, at the end of the street named after him. The competition is an international one, and three premiums are offered of 6,000, 4,000, and 3,000 francs. The cost of the statue and its mounting must not exceed 200,000 florins, and designs and models must be delivered before October 1, 1893. The competition will be decided by a jury appointed for the purpose.

THE CORINTH CANAL. — On the Corinth Canal there still remain to be removed some 40,000 cubic feet of earth and stone, which work, however, will be completed in a few weeks. Two steam excavators and about 1,500 men are engaged on the work. The entire bed of the canal will be excavated in the course of a few months, and the walls on both sides are already partly completed. Pumping is constantly required. The work is now carried on by a Greek company, the original French one having failed.

LIVERPOOL ENGINEERING SOCIETY.—The second ordinary meeting of the nineteenth session of this society was held on Wednesday evening, November 9, at the Royal Institution, Mr. Robert E. Johnston, M.Inst.C.E., President, in the chair. Mr. A. J. Maginnis, M.Inst.N.A., read a paper entitled, "The Development of the Machinery of Atlantic Liners." The discussion upon the paper was adjourned to the meeting to be held on November 23.

RESIGNATION OF A DISTRICT SURVEYOR.—We reported last week the resignation of Mr. Charles Fowler, District Surveyor of Shoreditch and the Liberty of Norton Folgate, one of the most respected and experienced of the London District Surveyors. Mr. C. Fowler was appointed by the Middlesex Magistrates in 1855 (just before the Building Act was passed) to the District of St. Giles-in-the-Fields and St. George's, Bloomsbury, in succession to Mr. G. Pownall, who had resigned; and in 1871, on the death of Mr. Robert Warton, he was transferred to the District of Shoreditch, which he has held for twenty-one years. It is probable that the District will be amalgamated with some of the adjoining districts, and pending the decision of the London County Council, it has been placed (as we reported last week) in charge of Mr. Henry Lovegrove, District Surveyor of South Islington.

THE ENGLISH IRON TRADE. — The decisive triumph of the Democratic party in the recent Presidential Election in the United States has imparted a firmer tone to the English iron market generally. The tinplate industry, naturally, will be the first to benefit by the prospective tariff reductions, and consequently a better feeling is exhibited in this branch. In crude iron there is more doing, and both Scotch and Cleveland pig are quoted higher. Finished iron is only in moderate inquiry. Tinplates are in enhanced request. In steel little is doing, except in rails; but in Staffordshire a more hopeful view of the situation is entertained, judging from the additions to plant which are projected in that district. Shipbuilding continues quiet, and there is little change to chronicle in regard to engineers and ironfounders. The coal trade keeps fairly steady.—*Iron.*

ROYAL METEOROLOGICAL SOCIETY. — The first meeting of the session of this society was held on Wednesday evening, the 16th instant, at the Institution of Civil Engineers, 25, Great George-street, Westminster, Mr. A. Brewin, Vice-President, in the chair. Mr. E. T. Adams, Mr. A. L. Jones, M.R.C.S., Mr. J. E. Prince, and Mr. W. Tattersall, C.E., were elected Fellows of the Society. A paper by Mr. J. Lovel was read on the "Thunderstorm, Cloudburst, and Flood at Langtoft, East Yorkshire, July 3, 1892." The author gave an account of the thunderstorm as experienced at Driffield on the evening of this day; the full force of the storm was, however, felt in the wold valleys which lie to the north and north-west of Driffield, where great quantities of soil and gravel were removed from the hillsides and carried to the lower districts, doing a large amount of damage. Many houses in the lower parts of Driffield were flooded, and a bridge considerably injured. The author gives, in an appendix, a number of observations made on similar occurrences. Mr. W. H. Dines also read a paper—"Remarks on the Measurement of the Maximum Wind-pressure, and Description of a new Instrument for Indicating and Recording the Maximum." For some years the author has been conducting a large number of experiments with various forms of anemometer; and in the early part of the present year recommended the adoption of the tube anemometer for general use, as it appeared to possess numerous advantages. The head is simple in construction, and so strong that it is practically indestructible by the most violent hurricane. The recording apparatus can be placed at any reasonable distance from the head, and the connecting pipes may go round several sharp corners without harm. The power is conveyed from the head without loss by friction, and hence

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
*Cafe	Scarborough Bridge Cliff Co.	.....	Dec. 13
*School Buildings, Framlingham	The Governors	10*l.* and 5*l.*	Jan. 3
*Council Chamber, Offices, &c. Wakefield	County Council of the W. Riding of Yorks.	200*l.* 100*l.* 50*l.*	Feb. 1
*Baths and Washhouses, Chelsea	P. B. & W. Commrs	75*l.* 50*l.* 25*l.*	do.
*New Buildings, near Horsham	Council of Christ's Hospital	3 of 400*l.* each, &c.	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Alterations to Schools	Aldershot School Bd.	S. Stapley	Nov. 21
Galvanised Corrugated Iron Roof and Iron Columns	Rotherham Corp.	C. B. Newton	Nov. 22
Subway and Station Buildings, Featherstone, Pontefract	Lancs. & Yorks. Ry.	*Official*	do.
Block of Artisans' Dwellings, Manchester	do.	do.	Nov. 23
Boiler Tubes, Springs, &c.	East Indian Ry. Co.	do.	do.
Engine and Boiler Room, Well Sinking, &c.	St. Leonard (Shoreditch) Guardians	F. J. Smith	do.
Sewerage and Drainage Works, Market Harborough	.....	H. G. Coales	do.
Street Works, Market Harborough	.....	H. H. Holloway	do.
Auction Mart, Stonehaven, N.B.	.....	Geo. Gregory	do.
Wrought-iron Work	Cardiff Corporation	W. Harpur	do.
Paving and Kerbing, Pitman, &c. Streets	do.	do.	do.
Alterations, &c. Victoria Rooms, Bridlington Quay	.....	J. Shepherdson	Nov. 24
Stoneware and Cast-iron Pipes	Ystradyfodwg Loc. Bd.	J. W. Jones	do.
Private Drainage	Smethwick Local Bd.	J. C. Stuart	do.
Kerbing, Paving, and General Stores	Cork Corporation	*Official*	do.
Hotel and Cottages, Cathay, Cardiff	.....	John P. Jones	Nov. 25
Alterations, &c. to School Buildings, High Felling and Windy Nook	Heworth (Durham) School Board	H. Miller	Nov. 28
Thirty Cottages, Blaendydach, Rhondda Valley	.....	E. M. Bruce-Vaughan	do.
Asylum Work and Drainage, Ladysbridge	Banffshire Lunatic Asylum	A. & W. Reid	do.
Show Yard, Frome	Somerset Agri. Assoc.	Mr. Cottam	do.
Sewerage Works, Hempland-lane, &c.	York Corporation	Alfred Creer	do.
*Underground Conveniences	Com. of Sewers	*Official*	Nov. 29
*Levelling and Draining Site, Building Lodge and Chapel, &c. &c.	Attleborough Bur. Bd.	do.	do.
Sewer ripes, Kerbing, &c.	West Hartlepool Corp.	J. W. Browne	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Dwelling-house and Premises, &c.	Dorchester Municipal Charity Trustees	.....	Nov. 30
*Construction, &c. of Goods' Yard, Bristol	G. W. R. Co.	*Official*	do.
Railway Construction, Haswell	N. E. R. Co.	do.	do.
Cast-iron Gas Mains	Great Crosby Loc. Bd.	do.	do.
*Supply of New and Purchase of Old Stores	G. N. R. Co.	do.	Dec. 3
Board Room and Offices	Brighton Union	Nunn & Hunt	Dec. 5
New Road, Llest	Ogmore and Garw L. B.	H. D. Williams	do.
Culvert Bridge, Retaining Wall, &c. Blackmill	do.	do.	do.
Iron and Steel Castings, &c.	Swansea Harb. Trust.	*Official*	do.
*New Cemetery Works	Richmond (Surrey) Town Council	E. J. Lovegrove	do.
*Installation of Electric Light at Claybury Asylum	London County Council Asylums Committee	*Official*	Dec. 6
*Additions, &c. to Schools	Orpington School Bd.	G. St. Pierre Harris	do.
*Paving Works	Brentford Local Board	*Official*	do.
*Sorting Office, Catford	Com. of H. M. Works	do.	do.
*Additions to Buildings of Public Record Office	do.	do.	Dec. 9
*Public Conveniences, Finsbury-park	London County Council	do.	Dec. 12
*Steam Crane, Weighing Machine, and Tip Wagons	Borough of West Ham	Lewis Angell	do.
Hospital, Heanor-road, Ilkeston	Committee	C. W. Hunt	Jan. 1
*Buildings at the Artillery Camp, Okehampton	War Department	*Official*	No date
New Infirmary, Halifax	.....	Worthington & Elgood	do.
Three Houses, Ilkley	.....	Hsaitt & Adkin	do.
Model Bakery, Hereford	.....	W. W. Robinson	do.
Alterations to Free Library, Hereford	.....	do.	do.
*Erection of Cottages, Devonport	.....	W. N. Richards	do.
Eight Houses, Winchester-road, Armley, Leeds	.....	Jas. Charles & Sons	do.
Covering Steam Pipes (400 yards)	Aberdare Navigation Colliery	.....	do.
Shaft-sinking, Gelli, Ystrad, Glam.	Cory Bros. & Co. Lim.	.....	do.
Parsonage House, Camerton, Carlisle	.....	G. Dale Oliver	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Borough Engineer and Surveyor	Birkenhead Corp.	500*l.* &c.	Nov. 23
Engineer	The London and India Docks Joint Com.	800*l.*	Nov. 24
*Inspector of Nuisances	Stroud Local Board	100*l.*	Nov. 28
*Sanitary Inspector	Hammersmith Vestry	45*s.* weekly	Nov. 30
*Surveyor and Engineer	Southend-on-Sea Corp.	250*l.* and as Gas Examiner, 15*l.*	Dec.

Those marked with an Asterisk (*) are advertised in this Number. *Competitions, p.* iv. *Contracts, pp.* iv., vi., *&* viii. *Public Appointments, p.* xxi.

the instrument may be made sensitive to very low velocities without impairing its ability to resist the most severe gales. In the present paper the author describes an arrangement of this form of anemometer which he has devised for indicating very light winds, as well as recording the maximum wind pressure.

SOCIETY OF ARTS.—The inaugural address of the 139th session of this Society was delivered on Wednesday evening last by the Chairman of the Council, Sir Richard Webster, Q.C., M.P. Previous to Christmas there will be four other meetings. Mr. Seymour Haden, F.R.C.S., will read a paper on "The Disposal of the Dead," on November 23; Mr. James Douglas, one on "The Copper Resources of the United States, on November 30; and Mr. James Dredge, one on the "Chicago Exhibition of 1893," on December 7. At subsequent meetings, the dates of which are not yet published, papers will be read by Prof. George Forbes, F.R.S., on "The Utilisation of Niagara;" Mr. Bennett H. Brough, "The Mining Industries of South Africa;" Prof. Francis Elgar, LL.D., "Transatlantic Steamships;" Prof. Frank Clowes, D.Sc., "The Detection and Estimation of small proportions of Inflammable Gas or Vapour in the Air;" Mr. William Key, "The Purification of the Air Supply to Public Buildings and Dwellings;" Mr. Wilton P. Rix, "Pottery Glazes, their Classification and Decorative Value in Ceramic Designs;" Prof. W. Noel Hartley, F.R.S., "The Chemical Technology of Oil-boiling, with a description of a New Process for the Preparation of Drying Oils, and an Oil Varnish;" Sir William Wilson Hunter, K.C.S.I., C.I.E., LL.D., "Ten Years of Progress in India;" Sir Edward N. C. Braddon, K.C.M.G., Agent-General for Tasmania, "Australasia as a Field for Anglo-India Colonisation;" Sir Juland Danvers, K.C.S.I., late Public Works Secretary, India Office, "Indian Manufactures;" Mr. Jervoise Athelstane Baines, I.C.S., Imperial Census Commissioner for India, "Caste and Occupation at the last Census of India;" Mr. Edward J. Howell, "Mexico, Past and Present;" Mr. Cecil Fane, "Newfoundland;" Mr. W. B. Percival, Agent-General for New Zealand, "New Zealand."

LEGAL.

CASE UNDER THE METROPOLITAN BUILDING ACT.

AT the South-Western Police-court, on the 11th inst., Messrs. Strudwick & Co., builders, of Ealing, were summoned for erecting a wood and iron verandah, contrary to section 26, and without due notice to the District Surveyor.

The case was before the Court on September 30 last, when Mr. Cheston, the District Surveyor, agreed to an adjournment to enable the defendants to apply for the sanction of the London County Council.

Mr. Cheston stated that he found no application had been made to the Council, and also that he had received no communication of any kind since the adjournment respecting the structure.

Evidence having been given as to the irregularity, the Magistrate made an order for removal, and inflicted a fine of 5*l.* and costs in respect of the neglect to give notice.

MEETINGS.

FRIDAY, NOVEMBER 18.

Architectural Association.—Mr. Paul Waterhouse on "Some Mysteries of Modern Architecture." 7.30 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. J. F. J. Sykes on "The Nature of Nuisances, including Nuisances the Abatement of which is Difficult." 8 p.m.

MONDAY, NOVEMBER 21.

Royal Institute of British Architects.—(1) General Business Meeting (for members only). (2) Special General Meeting for the election of an Honorary Secretary. (3) Paper by Mr. John D. Crace on "Picture Gallery Decoration." 8 p.m.

Society of Arts (Cantor Lectures)—Professor Vivian B. Lewes on "The Generation of Light from Coal Gas." I. 8 p.m.

Leeds and Yorkshire Architectural Society.—Address by the President, Mr. George B. Bulmer, F.R.I.B.A. 7.30 p.m.

TUESDAY, NOVEMBER 22.

Institution of Civil Engineers.—Discussion on the following papers:—(1) "Halifax Graving-Dock, Nova Scotia" by the Hon. R. C. Parsons, M.A. (2) "Cockatoo Island Graving-Dock, New South Wales," by Mr. E. W. Young. (3) "The Alexandra Graving-Dock, Belfast," by Mr. W. Redfern Kelly. (4) "Construction of a Concrete Graving-Dock at Newport, Monmouthshire," by Mr. Robert Pickwell. 8 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Professor A. Bostock Hill on "Trade Nuisances." 8 p.m.

Glasgow Architectural Association.—Smoking Concert and Exhibition of Drawings.

WEDNESDAY, NOVEMBER 23.

Society of Arts.—Mr. F. Seymour Haden on "Cremation as an Incentive to Crime." 8 p.m.

Liverpool Engineering Society.—Mr. George F. Deacon on "The Vyrnwy Works." 8 p.m.

THURSDAY, NOVEMBER 24.

Institution of Civil Engineers.—Students' visit to the Gas Light and Coke Company's Chief Offices, Horseferry-road, Westminster. 2.30 p.m.

Society of Antiquaries.—8.30 p.m.

FRIDAY, NOVEMBER 25.

Sanitary Institute (Lectures for Sanitary Officers).—Professor A. Wynter Blyth on "Sanitary Law: English, Scotch, and Irish: General Enactments; Public Health Act, 1875; Model Bye-Laws, &c." 8 p.m.

SATURDAY, NOVEMBER 26.

Artists' Benevolent Fund.—Annual Dinner, Sir Edward Clarke in the chair. Criterion, 7 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

19,887.—HANGING OF DOORS AND SHUTTERS: *A. McNerney.*—This invention relates to a method of hanging doors and shutters to facilitate the easy and safe opening or closing of the same. The doors are suspended from pulleys running in grooves above, and their lower edges slide in a groove in the floor. By an inclination given to the grooves an automatic movement rack is secured, and springs entirely dispensed with.

4,878, SANITARY PIPES AND DRAINS: *W. Sterling.*—By this specification the inventor proposes to either make the sockets of the same length as at present used, or preferably longer, and partially larger and partially smaller, and to thicken the spigot end of the pipes to form a raised lug or end at a short distance from the end of the spigot, or to make the pipe of such thickness as to admit of a recess or groove being formed around it. He claims an enlarged sealing socket in conjunction with the pipe-socket, and a thickened spigot-end. Such pipes may be made of any material, or of any size desired.

14,871.—STARTING SYPHONS OF FLUSHING CISTERNS: *W. B. H. Drayson.*—This invention has for its object the prevention of the "gurgling" sound caused by the entrance of air into the short leg of cistern syphons, which it proposes to obviate by providing means whereby an air-valve can be supplied to the moving part or bell of a syphon without opening when such bell is moved, which is effected by an arrangement of crank levers, counterbalance weights, &c.

15,641.—ROOFS OF HORTICULTURAL AND OTHER BUILDINGS: *H. J. Pullen-Burry.*—This invention relates chiefly to horticultural glass-houses, and it consists in certain improvements applied to the hinged lights or frames which are arranged in the roof near the ridge for ventilating and other purposes, which is effected by improved counterbalancing.

9,248.—STENCIL-PLATES: *A. C. Thomson.*—This specification describes stencil-plates of whatever material having their surface roughened with lines, grooves, ribs, projections, or equivalent modifications. In "milled" metal or vulcanite stencil-plates, the milling may be "cross," "point," or "single line," &c., and in glass plates the surface may be roughened by any desirable means. Instead of using the ordinary wheel or steel point style when writing on the stencil-paper, a style having a small steel ball or roller at its end may be used.

17,477.—DRAIN-TESTING APPLIANCES: *J. Suffield & J. Williams.*—This invention consists of an article in which can be placed a small glass tube, containing any required chemical, such as essence of peppermint or the like, and this article can be floated down past the seal of the trap of any drain for a given distance, when by pulling the string which is attached to the same, the glass will be broken and the strong-smelling chemical deposited in the drain, when, should there be any fault in the drainage system, the same will be discovered by the escape of the odour of the chemical. In order to effect this the patentees form a case of thin sheet metal, capable of containing a glass tube charged with the chemical. This case is provided with a hinged arm and lever, and is attached to a string. When it has been placed in a drain and has been washed down to the length of the cord, the catch is released, and the spring arm breaks the tube and liberates the contents.

19,476.—SASH WEIGHTS: *T. Smith.* By this invention the sash-weight is made in separate lengths, the upper length having the ordinary eye at one end for the sash-cord, and at the other end a double eye with sunk recesses opening through one side to receive corresponding outside projections upon a single eye cast on the upper end of the next length, succeeding lengths being cast in the same way, so that when linked to each other they form a hinge-jointed chain of weights, which, when in the window-box or casing, cannot become detached from each other. Thus less room is occupied in proportion to weight, and facility is afforded for altering the weight by linking separate pieces together.

21,196.—COWL OR WIND-GUARD: *M. Neuerberg.*—This patentee claims a cowl or guard comprising a freely pivoted ball of larger diameter than the mouth of the chimney-shaft or equivalent, and counter-weighted

above its pivot; also a conical skirt around the shaft, and a horizontal deflecting plate over the mouth thereof.

21,779.—KILNS: *E. Brook.*—With a view to the utilisation of the heat in the waste gases escaping from a kiln, this inventor proposes so to arrange kilns and connect them with a steam jet blower or exhauster that the products of combustion of one kiln can be caused to pass from it to the "bags" of another kiln, and thence through the steam jet apparatus to the outlet flue of a third kiln.

11,299.—BOARDED FLOORS: *O. Hetzer.*—The inventor proposes to obviate the warping and expansion and contraction of boarded floors arising from changes of weather and temperature by framing them. For this purpose the boards in short lengths are slid in grooves formed in the edges of stonter boards, termed "framing timbers," which run across the narrowest breadth of the room. The patentee claims that by his system perfect ventilation is insured in connexion with the floor and skirting-boards, and that the growth of dry-rot is prevented even in a house not quite dry.

9,115.—SKYLIGHTS: *C. Werner.*—The object of this invention is to produce a skylight which shall combine facility of fitting with water-tightness. This end is obtained by the peculiar construction of the frame of the light, which consists of two parts adapted to slide one over the other, the edges of the roof being embedded between the two flanges, thus securing a closing so tight as to exclude all rain, snow, and cold.

16,641.—COUPLING FOR LIGHTNING CONDUCTORS: *J. Lewis.*—In order to prevent bad contact from the ordinary form of couplings not fitting properly, according to this invention they are made, instead of in two pieces, in one piece of link or stirrup form, with screwed sockets to take the flattened top of the rod, which is of dovetail or wedge shape for retaining the tape, which is fastened by being doubled on itself, the strain on the tape materially assisting in maintaining good contact.

NEW APPLICATIONS FOR LETTERS PATENT.

October 24.—19,042, W. Butler and C. Mason, Brick and Tile Making Machine.—19,085, A. Beesley, Springs for Doors.

October 25.—19,098, F. Durham, Warming and Ventilating.—19,099, W. Harrison and W. Jackson, Testing Drains.—19,116, J. Grolimund, Planes.—19,122, J. Sutton and J. Thompson, Fireplace Grates.—19,195, P. Dop, Protective Covering for the Seats of Water-closets.

October 26.—19,207, E. Beaumont, Window Fastenings.—19,216, L. Jenkinson, Circular Saws.—19,255, W. Jacques, Safety Catch for Windows.

October 27.—19,267, G. Howard, Decorating Walls, Ceilings, &c.—18,283, P. König, Spring-catch or Fastener.—19,304, J. Kirkman, Waste-Water-closets.—19,310, H. Phillips, Chandeliers.—19,323, R. Moreland, jun., and G. Auber, Window Sash-fastener.—19,343, C. Lamb and H. Vickers, Supporting Rain-water and Soil-pipes to prevent overflow of water from leaky joints flowing down walls; also enabling pipes to be painted and caulked for passing sanitary tests.

October 28.—19,355, H. Petley, Window Sash-fastener.—19,389, J. Day, Combined Apparatus for Overflow and Quick-flow Waste from Baths, Lavatories, Sinks, &c.—19,397, F. Windham and P. Everitt, Automatically-producing Hygienic Spray in Water-closets or Urinals.

October 29.—19,433, A. Dawes and J. Mason, Fastenings for Cupboard-doors, French Windows, &c.—19,469, A. Dixon, Window Fastener.

October 31.—15,902, C. Horton, Water-closets.—19,521, W. Hartmann, Metal-cutting Saw.—19,524, T. Laurie, Huts or Buildings for Military purposes.—19,532, J. Crook, Sash Cord Grip or Fasteners.—19,589, H. Simmons, Flushing-valves for Water-pipes, Soil-pipes, &c.

November 1.—19,599, H. Birkbeck, Spring-hinge.—19,604, H. Tuller, Plumb-bobs.—19,607, J. and A. Gray, Cutter-heads for Grooving or Tongueing boards.—19,618, C. Houghton, Windows.—19,622, J. Yeadon and W. Adgie, Manufacture of Cements, &c.

November 2.—19,683, F. Poole, Squares.—19,696, J. Inwood, Watertight Skylights, Conservatories, &c.—19,762, R. Sims, Planes.

November 3.—19,813, O. Böklin, Cement or Cement Mortar.

November 4.—19,856, F. Taylor, Nails.—19,876, W. Horn, Tool for Pointing Masonry.—19,877, F. Sage, Protectors for the Legs of Wheelbarrows, &c.—19,883, H. Savage, Decorations for Mouldings, Cornices, &c.—19,886, W. Fuller, Making House Connexions with Electric Lighting Mains.—19,904, F. Bodley, Device for Opening Windows.

November 5.—19,908, C. Picking, Fireproof Buildings.—19,944, J. Pethick, Water-closets.—19,947, W. de Gelse, Preserving Timber.—19,956, A. Greig, Brick Machines.—19,970, J. Yeadon and W. Adgie, Fire Bricks, Retorts, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

16,913, F. Moore, Nails and Screws.—17,633, P. Overden and H. Bunker, Water-pipes.—17,800, J. Fauld, Stone-planing Machines.—18,348, T. Cuthbert, Wood Flooring and Pavements.—18,619, T. Robinson, Band-sawing Machines for Cutting Wood and Other Materials.—14,619, A. Marriage and C. Richardson, Flushing Cisterns.—17,442, J. Russell, Stove Grates.—17,713, P. Moorwood and H. Moorwood, Stoves, Grates, Cooking-ranges, &c.—17,796, L. Wilson, Veneer Wood, Tiles, &c.—17,853, S. Jennings and J. Morley, Water-closets.—17,942, W. Worssam, Bands and Guide.—18,114, T. Coulthard, Door Locks having a Combined Night Latch and Bolt.—18,456, J. Seads, Increasing Draught to Fire-places and Ventilating Rooms.—18,485, B. Phillipson, Drain Pipes and Drainage Appliances.—18,603, F. Lynde, Water-closet Flushing Cisterns.—18,754, T. Thorp, Drain Pipes, &c.—18,881, W. Greaves, Open-fire Ranges or Stoves.—19,042, W. Butler and C. Mason, Brick and Tile-making Machines.—19,098, F. Durham, Warming and Ventilating.—19,099, W. Harrison and W. Jackson, Testing Drains, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

22,111, E. Nelson (trading as F. McNeil & Co.), Material for use as a Damp Course in Building Foundations.—22,268, T. Sterratt, jun., Absolute Locking Brick.—22,548, F. Thersing, Construction of Wooden Floorings.—22,562, W. Horn, Brick Kilns.—17,011, W. Mihill, Granite Hammers.—17,318, J. Eves and M. Greeves, Ventilators.—18,901, J. Torres and J. Benjinnes, Heating Apparatus.—18,927, T. Knell, Fastening for Door-knobs and Handles.—21,304, J. Callie and J. Brown, Step-ladder.—187, G. Skinner and J. Hill, Attaching Door-knobs or Handles to their Spindles.—16,353, H. Richter, Holder for Sliding Sash-windows.—17,127, W. Sterling, Sanitary Pipes.—17,232, L. Sagendorph, Metallic Facing Plates for Buildings.—17,402, J. Sheppard, Sash-balances.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

NOVEMBER 4.—By *Messrs. Cobb* (at Sittingbourne): Freehold fruitland, Sittingbourne, Kent, 22a. 0r. 22p., 4,100*l.*; three enclosures of f. arable land, 23a. 3r. 25p., 2,000*l.*

NOVEMBER 8.—By *W. Wingham*: No. 117, Bermondsey New-road, f., 530*l.*—By *Thurgood & Martin*: F.g.r. of 100*l.*, King-st., Regent-st., reversion in 28 yrs., 4,000*l.*; I.g.r. of 120*l.*, Great Russell-st., u.t. 42 yrs., g.r. 60*l.*, 1,100*l.*; i.g.r. of 8*l.*, Bartholomew Villas, Kentish Town, u.t. 69 yrs., g.r. 1*l.*, 135*l.*; i.g.r. of 32*l.*, Patshull-rd., u.t. 69 yrs., g.r. 4*l.*, 580*l.*; 23 and 25, Evandale-rd., Brixton, u.t. 32 yrs., g.r. 5*l.* 2s., 310*l.*; 10 and 12, Bonnington-sq, Vauxhall, u.t. 82 yrs., g.r. 15*l.*, 700*l.*; f., set of chambers in "The Albany," Piccadilly, (D. 5), 600*l.*—By *Driver & Co*: "Billiter Buildings," City of London, area 22,000 ft., u.t. 78 yrs., g.r. 7,500*l.*, 25,000*l.*—By *A. Richards*: 9, The Parade, Edmonton, f., 450*l.*; a plot of f. land, Oakdale-rd., Upton-pk., 75*l.*; Elm House, Lower Fore-st., Edmonton, f., 485*l.*

NOVEMBER 10.—By *Farebrother, Ellis, & Co.*: 26, Kenton-st., Brunswick-sq., u.t. 7 yrs., g.r. 12*l.*, 150*l.*; 49, Kenton-st., u.t. 12 yrs., g.r. 13*l.* 13s., 140*l.*; 50 and 52, Kenton-st., u.t. 13 yrs., g.r. 31*l.* 10s., 260*l.*; 123, High-st., Hoxton, f., r. 100*l.*, area 5,200 ft., 1,650*l.*—By *C. C. & T. Moore*: 89, Antill-rd., Bow, u.t. 76 yrs., g.r. 6*l.* 3s. 6d., 525*l.*; f.g.r. of 12*l.*, Tower Hamlets-rd., Forest Gate, reversion in 85 yrs., 270*l.*; 5, 7, and 9, Chatsworth Cottages, Stratford, u.t. 865 yrs., g.r. 9*l.* 3s., 275*l.*; 1, Pownall-rd., Fulham, f., 350*l.*; 5 to 11 (odd), Ferrer's-rd., Streatham, u.t. 78 yrs., g.r. 18*l.* 18s., 700*l.*; 28, Ellora-rd., u.t. 79 yrs., g.r. 6*l.*, 240*l.*—By *A. H. Turner & Co.*: 20, Brunswick-sq., Camberwell, u.t. 50 yrs., g.r. 10*l.*, r. 40*l.*, 255*l.*—By *Segrave & Taylor*: 38, 39, and 40, Crosby-row, Borough, u.t. 50 yrs., g.r. 15*l.*, 340*l.*; 35, Derrick-st., Rotherhithe, u.t. 84 yrs., g.r. 1*l.* 10s., 100*l.*; 1, St. Anne-st., Limehouse, and 148, Eastfield-st., u.t. 20 yrs., g.r. 10*l.*, 110*l.*; i.g.r. of 69*l.* 12s., Regency-st., &c., Westminster, u.t. 10 yrs., g.r. 4*l.*, 345*l.*; i.g.r. of 58*l.*, Upper St. James-st., &c., Brighton, u.t. 10 yrs., g.r. 25*l.*, with short reversion, 450*l.*; 23, 25, and 27, Gill-st., Limehouse, u.t. 12 yrs., g.r. 10*l.* 7s., 175*l.*—By *Stimson & Sons*: 2, Wansey-st., Walworth, u.t. 50 yrs., g.r. 4*l.* 10s., r. 38*l.*, 340*l.*; 262 to 278 (even), East-st., f., 4,890*l.*; 282 to 296 ditto, ditto, f., 2,540*l.*; f.g.r. of 5*l.*, East-st., and leaseholder's interest, reversion in 21 yrs, 200*l.*; 302, East-st., f., 320*l.*; 1 to 8, Claremont-ter., f., 1,000*l.*: seventeen sets of f. stabling, Alvey-mews, 4,600*l.*; 1A and 3A, Alvey-st., f., 940*l.*; "The Gloucester Arms," beerhouse, Alvey-st., f., 910*l.*; 240 and 251, East-st., f., 450*l.*; 108 to 122A (even), Barlow-st., and 1 and 2, Woodcottages, f., 3,510*l.*; Boyson-rd., Camberwell, "The South London Auction Mart," u.t. 58 yrs., g.r. 35*l.*, 760*l.*

NOVEMBER 11.—By *Millar, Son, & Ball*: 43, Avenue-rd., Regent's Pk., u.t. 17 yrs., no g.r., 760*l.*; 1, Loudoun-rd., St. John's Wood, u.t. 28 yrs., g.r. 15*l.*, r. 140*l.*, 1,260*l.*—By *E. Wood*: 11 to 70, Jupp's-rd., Mile End; 50, Longfellow-rd.; and 19, Whitman-rd., u.t. 56 yrs., g.r. 260*l.*, 7,050*l.*; 1 and 2, Milton-rd., Hendon, u.t. 90 yrs., g.r. 10*l.*, 220*l.*—By *E. Christian*: 106, Jamaica-st., Stepney, u.t. 16 yrs., g.r. 4*l.*, 175*l.*; 1 to 8, Nutley-ter., Turnham Green, c., r. 137*l.* 16s., 800*l.*; 71, Windmill-pl., f., 200*l.*

[Contractions used in these lists.—F.g.r. for freehold ground-rent; I.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold: l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	9/0/0 — 8/0/0
Teak, H.I.	load	9/10/0 — 15/0/0
Sequoia, U.S.	ft.cu.	2/4 — 3/0
Ash, Canada	load	2/10/0 — 4/0/0
Birch, do.		3/5/0 — 4/10/0
Elm, do.		3/10/0 — 4/15/0
Fir, Dantzic, &c.		1/10/0 — 3/10/0
Oak, do.		3/0/0 — 5/5/0
Canada		5/10/0 — 7/0/0
Pine, Canada red		2/10/0 — 3/10/0
Do, yellow		2/10/0 — 5/0/0
Lath, D'ntzic, fath		5/0/0 — 6/0/0
St. Petersburg		5/0 0 — 7/0 0
Deals, Finland		
2nd & 1st std	100	7/10/0 — 9/10/0
Do, 4th & 3rd		7/0/0 — 8/0/0
Do. Riga		6/10/0 — 8/0/0
St. Petersburg, 1st yellow		10/10/0 — 14/10/0
Do. 2nd yellow		8/0/0 — 9/10/0
Do. white		7/0/0 — 9/10/0
Swedish		7/10/0 — 16/0/0
White Sea		8/0/0 — 17/0/0
Canada, Pine	1st	20/0/0 — 26/10/0
Do. do. 2nd		14/10/0 — 16/0/0
Do. do. 3rd, &c.		7/10/0 — 10/0/0
Do. Spruce. 1st		8/10/0 — 11/0/0
Do. do. 3rd & 2nd		6/10 0 — 8/0/0
New Brunswick		6/10/0 — 7/0/0
Battens, all kinds		5/10/0 — 15/10 0
Flooring Boards, sq., 1 in. prep. 1st		8/3/0 — 9/14/0
Do. 2nd		6/7/0 — 9/10/0
Other qualities		0/3/0 — 0/7/6
Cedar, Cuba	ft.	3½ — 4½
Honduras, &c.		2½ — 4
Mahogany, Cuba.		4½ — 6½
St. Domingo, cargo av		4 — 9/0
Mexican do. do		4 — 5
Tobasco do. do		4½ — 7
Honduras do.		5 — 6½
Box, Turkey	ton	4/0/0 — 13/0/0
Rose, Rio		10/0/0 — 20/0/0
Bahia		9/0/0 — 18/0/0
Satin, St. Domingo	ft.	0/0/7 — 0/1/3
Porto Rico		0/0/7 — 0/1/6

TIMBER *(continued)*.		
Walnut, Italian		0/0/3½ — 0/0/7
METALS.		
IRON—Pig, in Scotland	ton	2/1/11 — 3/0/0
Bar, Welsh, in London		5/17/6 — 6/0/0
Do. do. at works in Wales		5/7/6 — 5/10/0
Do. Staffordshire, in London		6/5/0 — 6/15/0
COPPER—British, cake and ingot		50 0/0 — 50/10,0
Best selected		50/10/0 — 51/10/0
Sheets, strong		59/0/0 — 0/0/0
Chili, bars		46/17/6 — 47/5/0
YELLOW METAL	lb.	0/0/5 — 0/0/5½
LEAD—Pig, Spanish	ton	10/2/6 — 10/5/0
English, com. brands		10/7/6 — 10/10/0
Sheet, English, 3 lbs. per sq. ft. and upwards		11/10/0 — 0/0,0
Pipe		12/0/0 — 0/0/0
ZINC—English sheet	ton	22/15/0 — 0/0/0
Vieille Montagne		23/5/0 — 0,0/0
TIN—Straits		94/5/0 — 94/15/0
Australian		94/15/0 — 95/5/0
English Ingots		97/10 0 — 98/0 0
Banca		95/10/0 — 95/12/6
Billiton		95/0/0 — 95/2/6
OILS.		
Linseed	ton	18/7/6 — 18/12/6
Cocoanut, Cochin		25/5/0 — 25/10/0
Do. Ceylon		24/0/0 — 0/0/0
Palm, Lagos		25/0/0 — 0/0/0
Rapeseed, English pale		25/0/0 — 0/0/0
Do. brown		23/5/0 — 0/0/0
Cottonseed ref.		18/0/0 — 0/0/0
Oleine		20/10/0 — 21/0/0
Lubricating, U.S.		4/0/0 — 5/0/0
Do. refined		5/10/0 — 12/0/0
TAR—Stockholm	barrel	0/17,6 — 0/18/6
Archangel		0/12/6 — 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

ACTON.—Accepted for new lodge, &c., adjoining Congregational Church:—
Maxwell Bros., Limited, 185, Upper Thames-street £513 0 0
[No competition.]

CANNOCK (Staffs).—For the erection of new Vagrant Ward, at the Cannock Union Workhouse, exclusive of heating apparatus. Messrs. J. R. Veall & Son, architects, Wolverhampton:—

Linford	£459 0	Guest	£420 0
Barten	438 0	Reynolds	399 10

CORK.—Accepted for alterations and additions to hospital. Mr. James F. McMullen, architect, 30, South Mall, Cork:—
John Delany & Co., Henry-street, Cork £1,545 0 0

CORK.—Accepted for rebuilding premises, 55, Patrick-street, Cork. Mr. J. F. McMullen, architect, 30, South Mall, Cork:—
Terence O'Flynn, Nile-street, Cork £412 0 0

DROITWICH.—For kerbing, paving, and channelling, &c., Ombersley-street, St. Andrew's-road, and part of Worcester-road, &c. Mr Bernard Godfrey, Surveyor, Droitwich:—

H. Welsh	£379 0 0	Jones & Fitzmaurice	£254 10 0
G. Trentham	296 10 0	Currall & Lewis	241 8 8
J. Hadley	275 15 0	T. Vale	240 0 0
T. Jones & Son	270 0 0	Emuss & Harris, Droitwich (accepted)	209 10
G. Law	269 10 10		

Tar Paving.

Melsom, Birmingham, 1s. 7d. per square yard, maintained free for two years; and fourteen years at ½d. per yard.

GATESHEAD.—For levelling, paving, channelling, &c., Victoria-road, for the Corporation. Mr. J. Bower, Engineer, Town-hall, Gateshead:—

G. Simpson	£390 19 2	W. Cumming, Gateshead (accepted)	£345 0 0
J. Wardlaw	322 13 10		

HARLESDEN.—For the erection of a library in High-street, Harlesden, for the Willesden Public Libraries Committee. Mr. J. Cash, architect, 55, Buckingham-road, Harlesden. Quantities supplied:—

Serff Bros.	£2,198	Sabey & Son	£1,377
Nightingale	1,477	Bowyer	1,329
J. M. Goodwin	1,450	G. Neal	1,309
R. A. Jerbury	1,446	T. Turner	1,271
F. T. Chenchen	1,415	Kellett	1,257
Godson & Son	1,400	Lorden & Sons	1,249
Godfrey & Sons	1,387	Houghton & Son	1,221

KEIGHLEY.—Accepted for the construction of sewerage works, for the Corporation. Mr. W. H. Hopkinson, Borough Engineer, Municipal-buildings, Keighley:—
Joseph Pullan, Malvern-place, Beeston Hill, Leeds.. £4,938 3 6

KINGSTON (Surrey).—For erecting stables, cart-sheds, &c., in rear of Clattern House, High-street, Kingston. Mr. Henry Macaulay, architect. Quantities by Mr. Alfred Boxall, 6, John-street, Adelphi:—

Reed, Bight, & Co	£2,698	J. Piller	£2,241
Nightingale	2,418	A. Martin	2,240
E. Wells	2,400	Lane & Son	2,205
J. H. Jarvis	2,393	J. F. Collinson	2,100

LLWYNHENDY (Carmarthenshire).—For erecting new schoolroom to Zoar Chapel. Mr. T. P. Martin, architect:—

John Davies	£1,414	Brown, Thomas, & John, Llanelly (accepted)	£1,099
Tom Hughes	1,376		

LONDON.—Accepted for alterations to 101, Cheapside, for the Palatine Insurance Company. Mr. Herbert Knight, architect, 129, Cheapside:—
Kirby & Chase £196 0 0

LONDON.—For completing premises Nos. 220, 224, 226, and 228, Earl's Court-road, S.W. Mr. James Kennedy, surveyor, 31, Great James-street, Bedford-row:—

Nos. 224 *and* 226.

B. E. Nightingale	£476	Macfarlane	£417

No. 220.

B. E. Nightingale	£147	Macfarlane	£139

No. 228.

B. E. Nightingale	£235	Macfarlane	£217

LONDON.—For new drainage at the United St. Saviour's Almshouses, Hamilton-road, Norwood. Mr. H. Hardwicke Langston, architect, 9, Great James-street, Bedford-row, London. Quantities not supplied:—

Hon-e & Son	£498 0	George Jennings*	£398 0
Wenham & Waters	398 10	*Accepted.	

LONDON.—For the erection of flats, Castle-street, St. Martin's-lane, W.C. Mr. A. E. Kingwell, architect, 13, Theobald's-road, W.C. Quantities by Mr. A. E. Richardson:—

J. Grover	£7,888	B. E. Nightingale	£7,353
Mark Patrick & Co.	7,670	Gould & Brand	6,953
E. Toms	7,535	Lamble	6,929

LONDON.—For the erection of two villa residences, and alterations and completion of house, at "Feniscowles," Streatham Common, for Mr. Arthur T. Groom. Mr. E. Guy Dawbar, architect, No. 22, Buckingham street, Adelphi, W.C. Quantities by Messrs. Stoner & Sons, 8, Blomfield-street, E.C.:—

	Credit.	Net
Drew	£8,537	£600 — £7,937
Foster & Dicksee	7,766	550 — 7,216
Wall	7,132	350 — 6,782
Marsland	7,375	610 — 6,765
Bullen & Co.	6,754	459 — 6,295
Patman & Fotheringham	6 823	605 — 6,218
Holloway Bros.	6,890	690 — 6,200
B. E. Nightingale	6,852	676 — 6,176
Smith	6,462	775 — 5,687

LONDON.—For building new stables, Lackland-terrace, King's-road, Chelsea, for the London Improved Cab Company. Mr. Ernest Flint, architect, Coleman-street, E.C.:—

B. E. Nightingale	£958	Russell	£856
Smith	877	Jarvis	756

MATLOCK BATH.—For the construction of a service reservoir, and the laying of water mains, &c., for the Local Board. Mr. W. H. Radford, engineer, Angel-row, Nottingham:—

Rawson, Pointon, & Co.	£5,600 0 0!	J. Bentley	£900 0 0
		Josiah Dale	875 15 0
Brown, Philips, & Co.	1,864 11 3	Enoch Tempest	820 0 0
J. F. Price	1,409 10 6	W. Farnsworth & Son, Cromford*	657 17 0
W. B. Askew	1,080 0 0	*Accepted.	

MIDDLETON (Lancs.).—For sewering, levelling, paving, &c., James, Langton, Sarah, and Wellington streets, for the Corporation. Mr. W. Welburn, Borough Surveyor, Town-hall, Middleton. Quantities by the Borough Surveyor:—
E. Partington & Sons, Middleton, Manchester (accepted at a schedule of prices on quantities).

NEWCASTLE.—Accepted for additions and alterations to store, Howdon-le-Wear, for the Crook Co-operative Society, Limited:—
John Hare, Crook £115 0 0

NORTHAMPTON.—For erecting a villa residence at Cogenhoe near Northampton, for Mr. Thomas Mann. Mr. H. H. Dyer, architect, Northampton. Quantities by the architect:—

W. Berrill	£1,358	W. Heap	£1,240
Sharp & Son	1,274	J. Wingrove, Northampton*	1,198

* Accepted.

NORTHAMPTON.—For the erection of a new corn store at Northampton, for Mr. J. Thompson. Mr. H. H. Dyer, architect, Northampton:—

Woodfor & Son	£725 0	J. Cetts	£645 0
W. Beardsmore	710 0	Geo. White	644 0
A. P. Hawtin	700 0	J. Dunkley	637 10
Green Bros.	684 0	J. Garrett Kingsley	634 0
J. Wingrove	674 0	[All of Northampton.]	

NORTHAMPTON.—For painting and decorating villa residence at Cogenhoe, Northampton, for Mr. T. Mann, jun. Mr. H. H. Dyer, architect, Northampton:—

J. Wingrove	£125	R. Cleaver (accepted)	£119
W. Ashton	119	[All of Northampton.]	

NORTH MIMMS (Herts).—For building Christ Church, Little Heath, North Mimms, Herts. Mr. W. H. Seth Smith, architect, No. 46, Lincoln's Inn Fields. Quantities by Mr. John Leaning, 28, John-street, W.C.:—

		Fittings.
Bristley	£2,876 0 0	£209 0 0
Triggs	2,779 0 0	159 0 0
Dove Bros.	2,745 0 0	155 0 0
Wimot & Sons	2,638 0 0	165 0 0
B. E Nightingale	2,614 0 0	160 0 0
J. Smith & Son	2,495 0 0	169 0 0
Goddard & Son	2,408 0 0	155 0 0
Cornish & Gaymer	2,400 8 4	159 14 5
Moody	2,183 0 0	157 0 0

PETERBOROUGH.—For alterations and additions to the Board School, Helpston, for the School Board. Mr. H. M. Townsend, architect, Peterborough. No quantities:—

Pine & Settall	£653 0	J. Crowson, Deeping	
D. Gray	587 0	St. James*	£535 19 0
W. Cave	552 10		

* Accepted.

POOLE (Dorset).—For roadmaking works, Emerson and Herbert roads, for the Town Council. Mr. John Elford, Borough Surveyor, King-street, Poole:—

W. H. Saunders & Co.	£223 14 1	G. T. Budden, Kinson*	£159 0 0
T. C. Rigler	175 0 0		

* Accepted.

PORT TALBOT (Glamorganshire).—For erecting an intermediate and technical school. Mr. T. P. Martin, architect, Heathfield-street, Swansea. Quantities by the architect:—

W. E. Rees	£4,500 0	D. C. Jones	£3,979 0
Morgan Cox	4,380 0	Thomas Watkins & Co.	3,847 7
David Jenkins	4,300 0	E. Thomas	3,527 0

ROTHERHAM.—For the erection of school buildings, St. Ann's Board Schools, for the School Board. Mr. H. L. Tacon, architect, Westgate, Rotherham. Quantities by the architect:—

Chadwick & Co.	£7,715	A. T. Ripley	£7,440
C. Green	7,504	Robt. Snell	7,376
Thornton & Son	7,504	Richd. Snell, Rotherham*	7,315

* Accepted

STANFORD-LE-HOPE (Essex).—Accepted for alterations at Ivy-Walls Farm for Mr. E. Tracey:—
Maxwell Bros., Limited, 185, Upper Thames-street £330 0 0
[No competition.]

TORQUAY.—For sewerage works, Belgrave-park and Avenue-road (contracts No. 1 and 2), for the Local Board. Mr. H. A. Garrett, Surveyor, Town Hall, Torquay. Quantities supplied:—

Contract No. 1.—Avenue-road Surface Drainage.

T. Shaddock	£1,045 11 2	W. Davey	£688 9 1
J. Shaddock	967 8 4	W. C. Shaddock	677 11 8
G. Green	963 17 8	S. Pack, Upton, Torquay*	672 13 0
J. Tozer	921 7 9		
F. Matthews	750 3 4		

* Accepted.
[Surveyor's estimate, £731. 6s. 9d.]

Contract No. 2.—Belgrave-park Sewer.

Geo. Green	£911 7 6	J. Tozer	£319 4 1
T. Shaddock	720 0 0	J. Matthews, Babbacombe*	305 19 0
W. C Shaddock	585 10 0		
J. Shaddock	449 5 0		

* Accepted.
[Surveyor's estimate, £330. 13s. 4d.]

SEVENOAKS.—For roadmaking and sewerage work at Eardley-road, for the Local Board. Mr. Jabez Mann, Surveyor, Local Board offices, Argyle-road, Sevenoaks:—

Edmund Iles	£1,168 7 11
Sidney Hudson, West Dulwich*	1,099 19 3
Woodhams & Fry	1,082 15 3

* Accepted on basis of schedule of prices.
[Surveyor's estimate, £1,147.]

WELLINGBOROUGH.—For the erection of a school and mission-room, Little Irchester, for the Vicar of Irchester and Trustees. Mr. H. H. Packer, architect, Silver-street, Wellingborough. Quantities by the architect:—

M. Mansell	£329 0	J. Underwood	£265 0
E. Sharpe & Son	314 0	Hy. Dorman	256 10
R. Marriott	290 0	J. Morris	256 0
H. C. Berrell, Irchester*	265 0	W. Stevens	220 4

* Accepted.

WILLESDEN.—Accepted for roadmaking and paving works, Cricklewood, Willesden, and Harlesden, for the Local Board. Mr. O. Claude Robson, Engineer, Public Offices, Dyne-road, Kilburn, N.W.:—

Howard-road, *Fairlight-avenue*, *Minet-avenue*, *Oaklands-road*, *Rockhall-road*, *Bridge-road*, *Taylor's-lane*	G. Bell, Tottenham	£789 0 0 389 0 0 443 0 0 623 0 0 385 0 0 774 0 0 1,066 0 0
Holly-lane, *Oak-road*	Neave & Son, Paddington	377 0 0 337 0 0
	R. Ballard, Chi'd's Hill	

[Total for the whole, £5,183.]

WORSBOROUGH (Yorks).—For supplying and laying 190 yards of 5-in. water-mains, for the Local Board. Mr. John Whitaker, Surveyor, Local Board Offices, Worsborough:—

Wm. Guest	£212	Higham & Porter	£150
Geo. Hall	173		

Alterations at the "Mitre" Tavern.—Mr. F. H. Hopkins writes to say that the amount of his tender for this work (see col. 2, p. 387) was 495*l*.,—not 195*l*., as it seems to be in part of our impression last week. As a matter of fact, the apparent mistake is due to the circumstance that the figure "4" had become damaged in printing.

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THE PANTHEON, ROME.—From a Photogra

(See the leading article in this issue.)

THE PANTHEON, ROME.—From a Photograph.

(See the leading article in this issue.)

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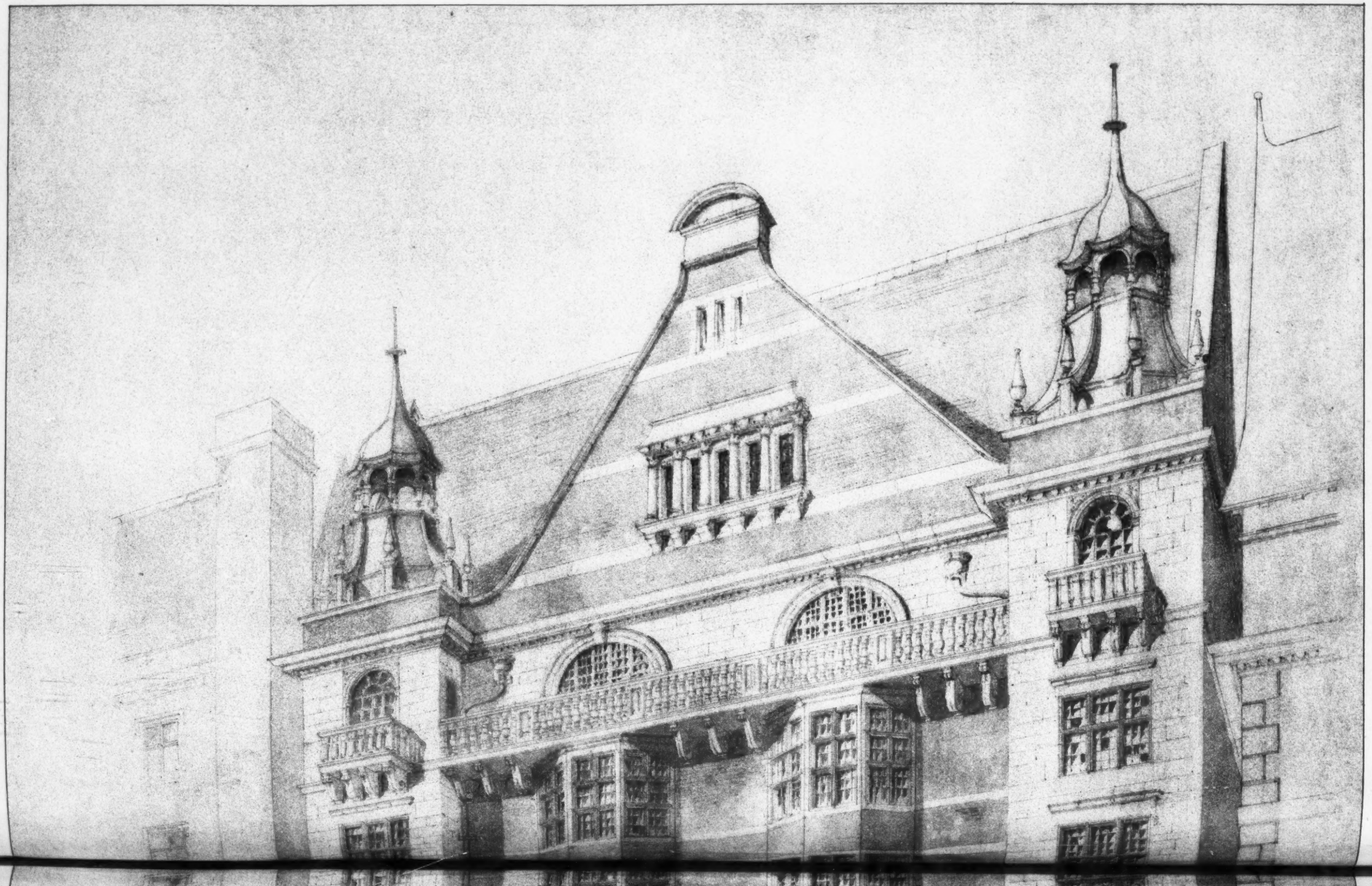

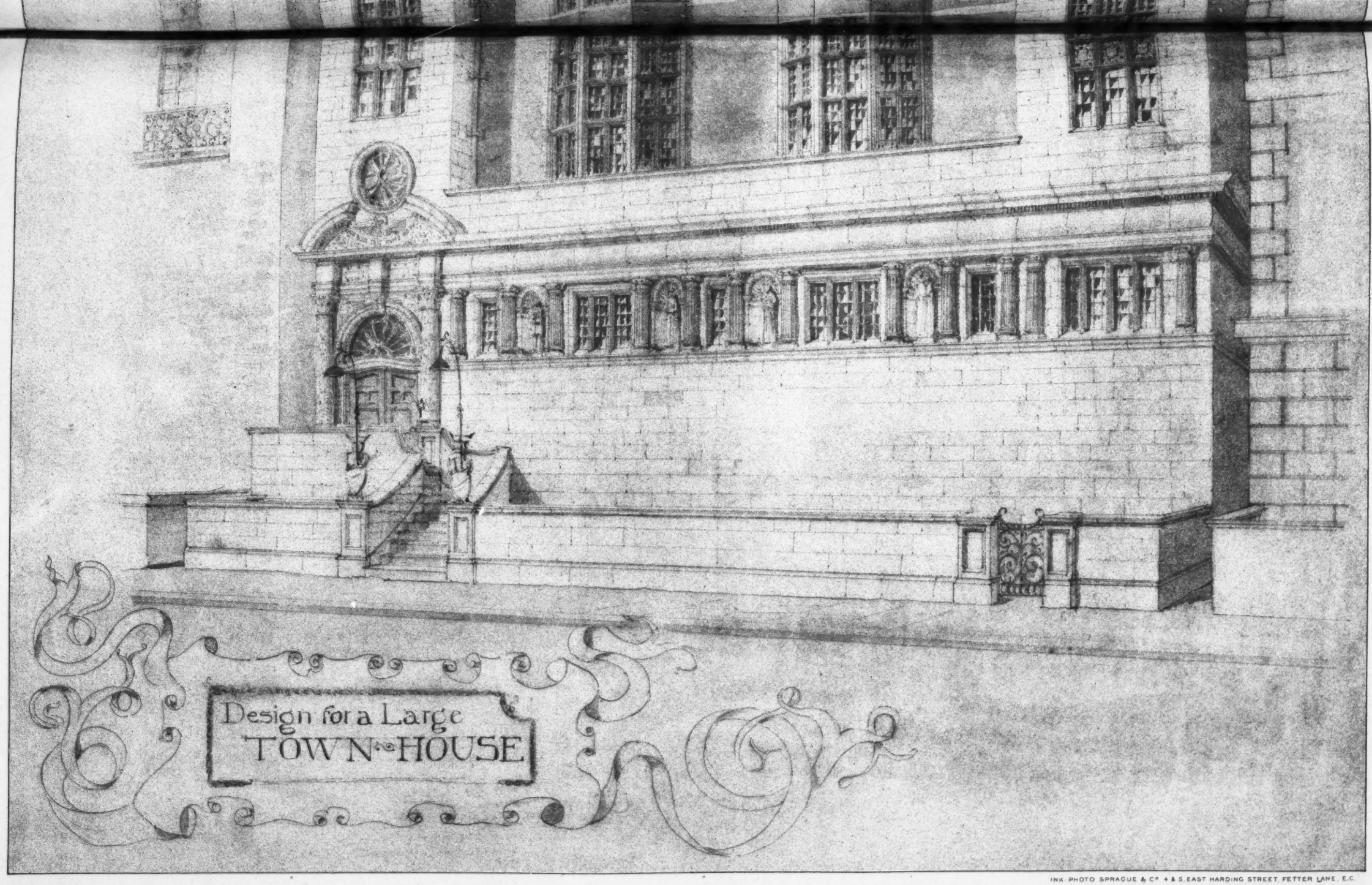

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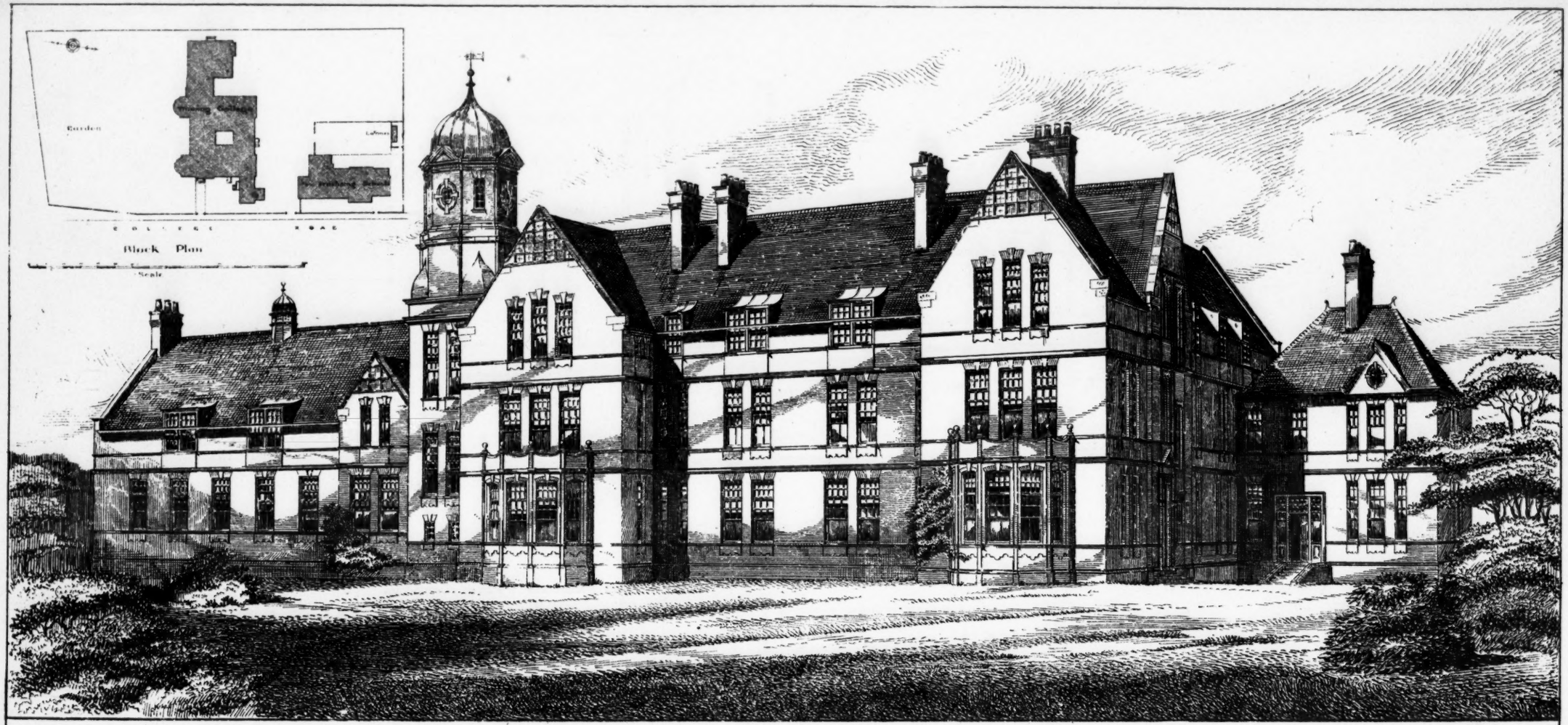
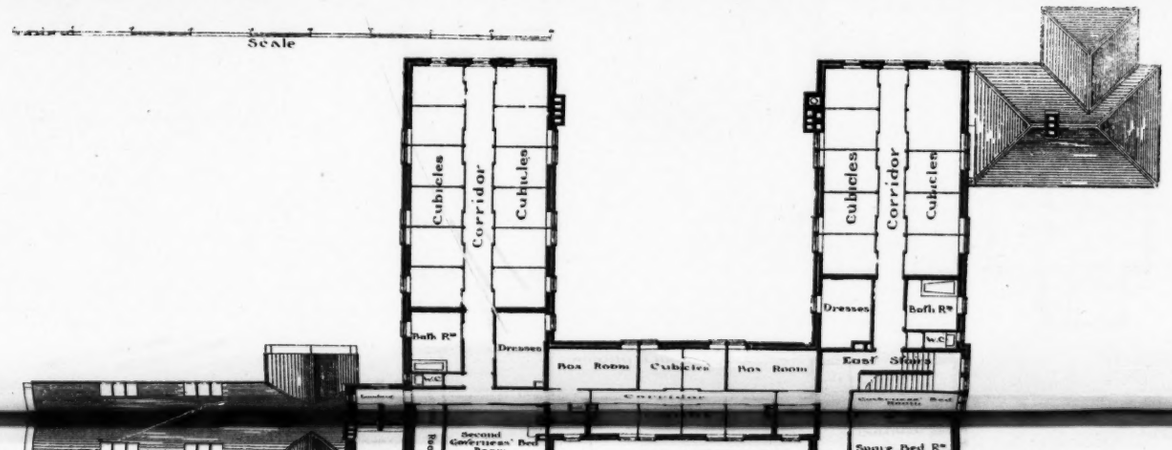
DESIGN FOR A TOWN HOUSE.—By Mr. Arthur Bartlett, A.R.I.B.A.

Royal Academy Exhibition, 1892.


Garden
Laboratory
College Road
Block Plan
Scale


Scale
Cubicles
Corridor
Cubicles
Bath Rm
Dresses
Box Room
Cubicles
Box Room
Corridor
Cubicles
Corridor
Cubicles
Dresses
Bath Rm
W.C.
East Staircase
Second Governess' Bed
Servants' Bed Rm

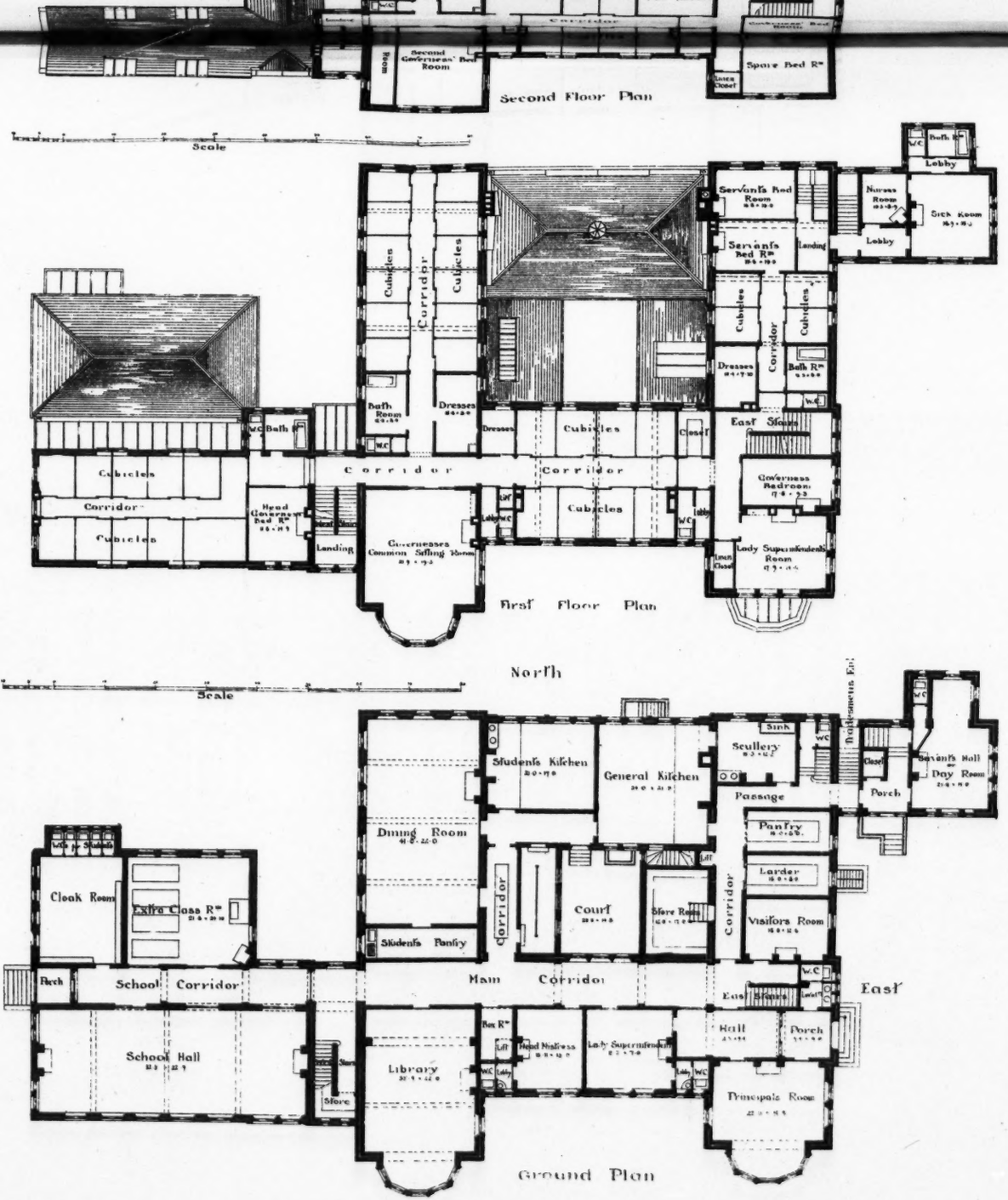
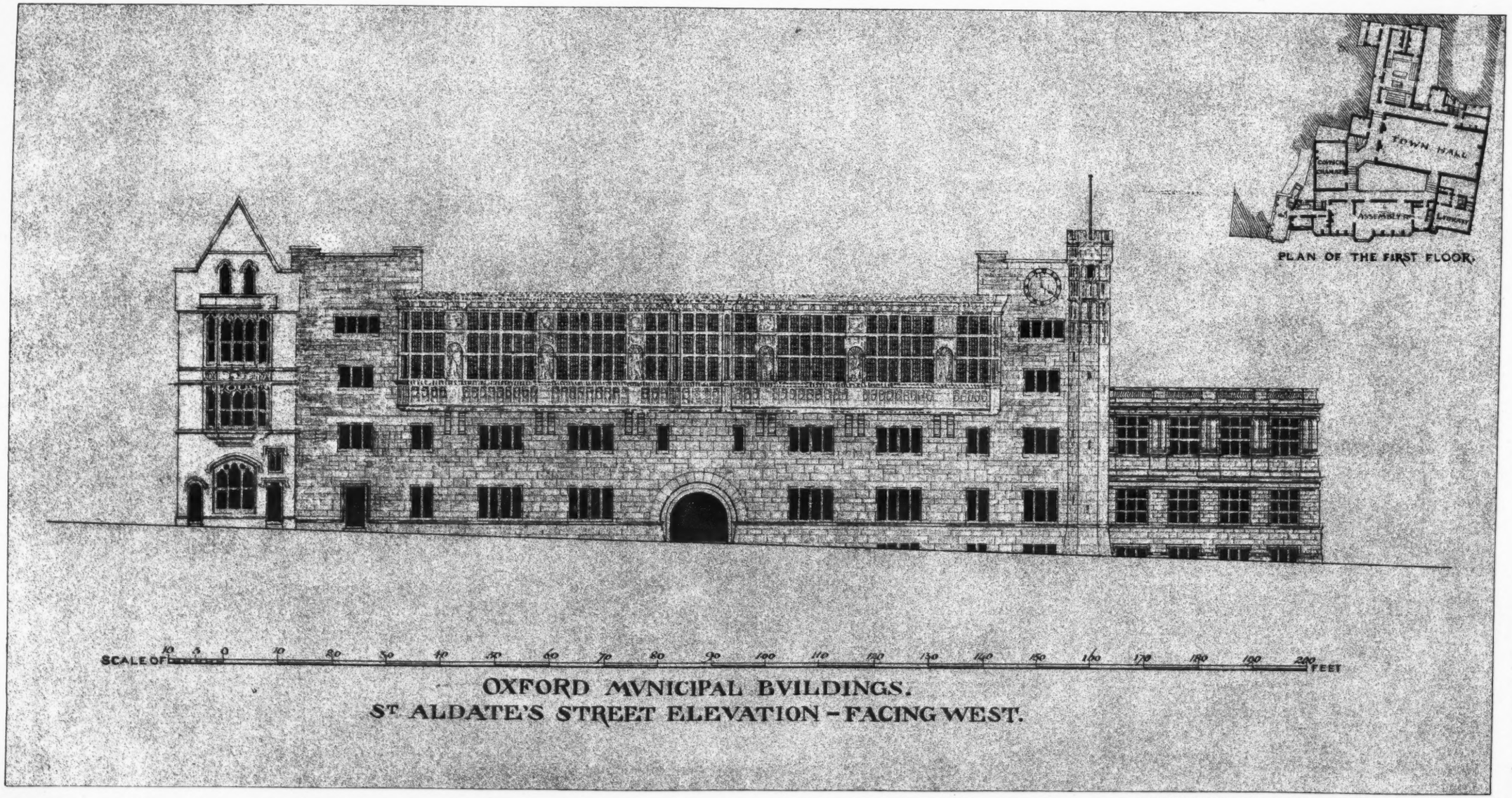


PHOTO-LITHO. SPRAGUE & Co 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

NEW TRAINING COLLEGE, NORWICH: VIEW FROM SOUTH-EAST.—MESSRS. OLIVER & LEESON, ARCHITECTS.

PROPOSED GROUP OF ALMSHOUSES, LATTON, WILTS.—Mr. C. E. Ponting, Architect

PROPOSED GROUP OF ALMSHOUSES, LATTON, WILTS.—MR. C. E. PONTING, ARCHITECT



OXFORD MVNICIPAL BVILDINGS.
ST ALDATE'S STREET ELEVATION - FACING WEST.

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COMPETITION DESIGN FOR OXFORD MUNICIPAL BUILDINGS. By MR. HALSEY RICARDO

Royal Academy Exhibition, 1892